vol. III no. 5
January, 1944

School Shop

FOR INDUSTRIAL ARTS & VOCATIONAL EDUCATION TEACHERS

Vocational Training for Exservicemen
by Ben Brodinsky

Industrial Education in Switzerland
by E. Jucker

Adjustable Chuck Board
by C. F. Fitz

Radio Power Supplies
by Ralph O. Williams

Shop Tested Projects ● News from Industry ● from Washington ● Strictly Personal ● News

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Brief
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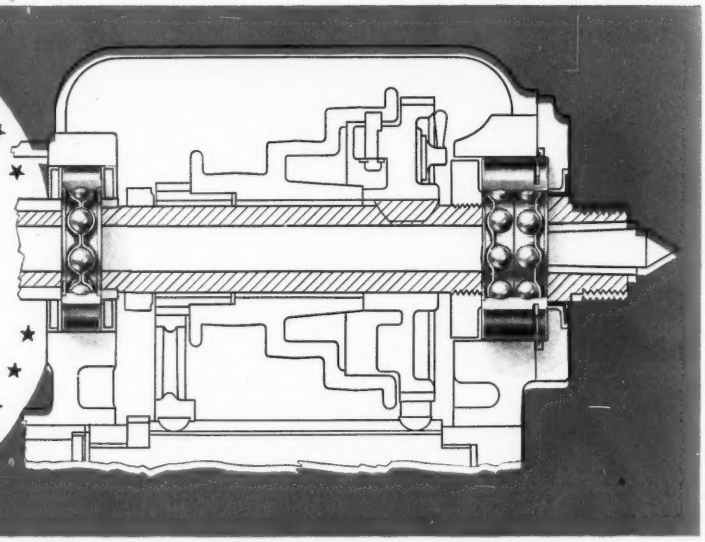

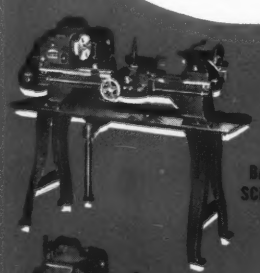

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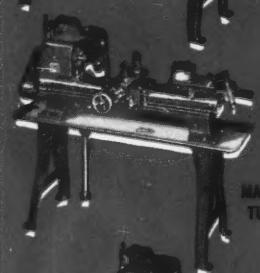

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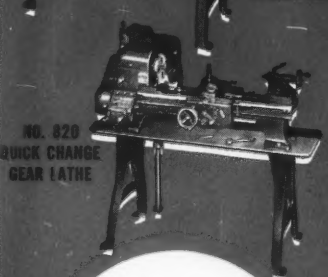

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School Shop

FOR INDUSTRIAL ARTS & VOCATIONAL EDUCATION TEACHERS

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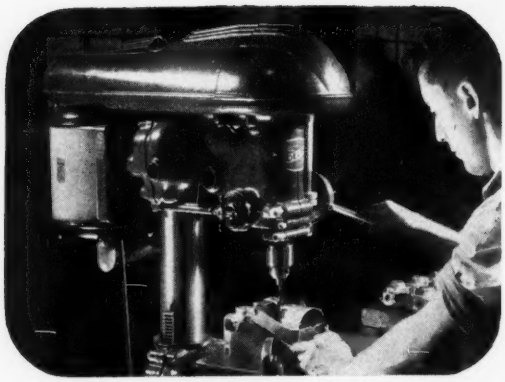

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CAA Photo

This photo of an Enlisted Reserve Corps class on power plants being taught in the Eufaula, Alabama, High School is a preview of the type of student and training which the government would subsidize under the Thomas Bill.

Vocational Training for Exservicemen

BY *Ben Brodinsky*

Peace is still a long way off but, to reverse the adage, "in times of war, prepare for peace." Congress is already tackling the job and the bill described in this article is one outcome which indicates the task which lies ahead for the schools. Unfortunately leaders in vocational education were not consulted when the bill was drawn up. Their voices will be heard, we trust, when it comes up for Congressional hearings. SCHOOL SHOP is publishing this article to acquaint schoolmen with the probable trend of postwar developments in our field.

STRIPPED to the waist and wearing mud-speckled shorts, American soldiers on a South Pacific base crowded about their famous visitor—Mrs. Eleanor Roosevelt. They plied her with questions about home and their future. And the question most frequently asked was: "Do you think when we get home we'll get a chance for education?"

In reporting this incident, the President's globe-trotting wife added that this war has developed among soldiers a "great thirst for education."

To quench this thirst, by providing the greatest educational opportunities ever planned for a victorious army, is the purpose of a new bill tossed in the Congressional hopper by Senator Elbert Thomas of Utah.

It proposes a billion-dollar outlay for the schooling of our ex fighting men and women. "*And for vocational education this measure, with certain modifications, presents an opportunity to help the nation convert to peace as effectively as it has helped the nation gear for war,*" says L. H. Dennis, Executive Secretary of the American Vocational Association.

The bill, S. 1509, incorporates most of the suggestions made last month by a Committee headed by Brig. Gen. Frederick H. Osborn. This Committee had been at work since November, 1942, when the Congress called for the induction of 18- and 19-year-olds. At that time President Roosevelt charged the group of educators to determine how young people, whose education had been interrupted by the war, may resume their schooling and technical training after their discharge.

Results of the Committee's work became known as the Osborn Report. It was received so enthusiastically on Capitol Hill that less than six days after its transmittal by President Roosevelt most of its recommendations found their way into Senator Thomas' Bill.

What does the bill provide? And what are some of the reactions of Washington's officials to the measure?

The bill says that all members of the armed forces, discharged or released from active duty after September 16, 1940, shall be eligible to go to school at Uncle Sam's expense. They must have served at least six months, however.

Potentially, this includes most of the 12,000,000 soldiers, sailors, marines, WACs, WAVEs, SPARs, and other service personnel. Members of the merchant marine are also eligible for this training.

Actually, however, the Osborn Committee expects that no more than 1,000,000 people will be interested in picking up their school work or in applying for new courses.

But some Washington officials esti-

mate that this number will be considerably larger. Young men and women who had dropped their school books at the time of induction without thought of resuming their school work are discovering new interests while in the armed forces and the wisdom of improving themselves through education.

The bill provides that veterans shall be *selected* for this training. In other words, no wholesale program of superficial "conditioning" is contemplated. Each person, says the bill, is to be selected on the basis of "his intelligence, aptitudes, school interest, prior training, education, or experience." Furthermore, the Act provides that training shall be encouraged in those vocations and occupations in which the number of trained personnel is or is likely to be inadequate. The President is required to "publish reports" regarding the need for trained personnel in the various trades, crafts, and professions. The purpose of these "reports" or studies is to help guide the people eligible to training which will improve their opportunities for useful work.

Here, then, are the beginnings of large-scale guidance and counseling work to be carried on in connection with the training program.

Says John J. Seidel, former AVA president, and now U. S. Office of Education Deputy Assistant Commissioner for Vocational Education: "The good this program will achieve will depend largely on the quality of guidance and counseling given the veterans. If the guidance is intelligent and effective, the training can be effective."

An effective guidance program, it is agreed, should take into consideration both the individuals' interests and needs of the community's and nation's labor market. It should eliminate the possibility of a great rush by veterans to enroll in, say, aviation mechanics courses in communities where demands for such mechanics is negligible, but which instead need skilled farmers.

Some such chaotic condition existed in the years preceding Pearl Harbor. Only by 1941 did the nation realize that we produced an over-supply of certain service, professional, and semiprofessional workers, and a severe shortage in mechanically trained people.

Bluntly, we had too many lawyers and not enough tool-and-die makers. After the war there is danger that we may have too many aviation mechanics and not enough service or business workers.

If the selection and guidance provisions of the bill are to be carried out intelligently, each community and state, and the nation as a whole, will have to make periodic surveys of its needs for trained workers. Veterans' counsellors will need facts on hand showing what industries are likely to boom and what industries are on the decline. They will have to make intelligent assessments of those opportunities which are likely to expand and those which are likely to decline.

Helping to determine these needs may fall upon a peace-time version of a Manpower Commission. At present, the U. S. Employment Service, major branch of the Manpower Commission, is already getting a rough picture of the manpower needs from major employers every six

Photo by U.S. Army Signal Corps

Brig. Gen. Frederick H. Osborn, Director, Special Service Division, Army Service Forces and Chairman of the Armed Forces Committee on Postwar Educational Opportunities for Service Personnel, the report of which resulted in the Thomas Bill. Other members of the committee were Captain Cortlandt C. Baughman, Director of Special Activities, Bureau of Naval Personnel, U. S. Navy; Rufus C. Harris, president, Tulane University; Dexter M. Keezer, Deputy Administrator, OPA, and former president of Reed College; Young B. Smith, dean, Columbia University Law School; and John W. Studebaker, U. S. Commissioner of Education.

months. Mr. Seidel, incidentally, does not believe that determining the needs for training should be the educators' task. Neither, says he, should the educator be made responsible for placing the veterans in jobs.

One year is named by the act as the period for which the person selected for training may attend the institutions. However, this is only a rough measure. Actually, students may have their schooling paid for by Uncle Sam for a period anywhere from six weeks to four years. Yardstick for the length of time any person may attend is the time required to complete the course of instruction chosen. Large numbers of veterans will want short, intensive courses of training to prepare themselves quickly for job opportunities.

On the other hand, a more select group, qualified to carry on graduate and postgraduate college work in chemistry, engineering, medicine, and physics, will be authorized, under the Act, to attend two, three, or four years. The number of persons selected in each state for the advanced instruction will be geared to the number of young men and women that state supplied to the armed forces.

The Osborn Committee estimates that about 200,000 exservice personnel will carry on their education for two years after their discharge, 165,000 for a third year and about 150,000 for a fourth year.

A powerful move is already apparent in Washington to lengthen the period of instruction for most veterans—specially qualified or not. Two reasons are behind the move. First, officials believe that one year is too short in which to give adequate training for jobs which will exist in the postwar world. They wish to avoid a generation of half- and semi-trained people. They believe that the war has already forced too much short-time training in one-skilled occupations.

The other reason for lengthening the period of instruction reflects fear that job opportunities may not be readily available after the war. Keeping a certain number of veterans "employed" in schools will take off the pressure for jobs at a time when industry will be in the very midst of reconversion to peace production and may not yet be ready to give jobs to all those who want them.

What kind of training will the exservicemen and women want?

The answer is given by the Osborn Committee itself: "If for no other reason than the urgency which most exservice people will feel to get jobs and get established after the war, we anticipate that their educational inclinations will run strongly in favor of . . . practical training."

This possibility presents vocational schools with great opportunities. In the words of Mr. Seidel: "This program, if enacted, gives us an opportunity to redirect vocational education to peacetime needs. For the past three years we have been training youth and men and women for war jobs. Much of this training had to be for uni-skilled jobs. Frequently schools had to train a particular man to do a particular job on a particular lathe. They had no opportunity to give him the broad background necessary in well-adjusted employment. They had to train for specific occupations needed to turn out quickly weapons of war.

"This will be changed with demobilization. The schools should be able to present veterans a rich fare of vocational training opportunities—for business, for service occupations, for home economics,

and for scores of other occupations labeled 'nonessential' in times of war. By redirecting vocational training we can help in the nation's reconversion to peace."

The parts of the bill which will set off the most lively debates in Congress pertain to the manner for footing costs of this venture. The bill calls on the United States government to pay each veteran's tuition, laboratory and other fees, and charges to the school or training institution. In addition, every person attending school full-time will be paid $50 a month living expenses. Married persons will be entitled to an additional $25 per month as well as $10 per month for each dependent child.

If these sums are not sufficient, the students may apply for a loan, over and above the outright allowances, of not more than $50 a month.

To an America which has prided itself that its sons and daughters can "work their way through school" this pay-for-going-to-school may have a foreign ring. The Osborn Committee itself first toyed with the idea of financing this education by means of loans. They rejected this plan, however, because they felt that it would saddle young men and women with heavy debts at the outset of their careers. Further, the Committee was afraid that such a program would "discourage many exservice people capable of helping to overcome the national educational deficit" from going to school on the basis of loans.

The bill is silent on the manner of administering the program. It merely directs the President to get from each state's governor a list of approved schools and institutions qualified to instruct exservice people selected under the act. The Osborn Committee went a step further. It recommended creation "within a permanent federal agency" of an office to assist state authorities to run this program.

Omitted also is any mention in the bill of the importance of conducting this program without undue federal interference, although the Osborn Committee stressed that the traditional state and local control of education should be fully respected. L. H. Dennis, AVA Executive Secretary, fears that in its present form, S. 1509 may tend to federalize education. He fears it would permit the mushrooming of new vocational-education agencies in the states under the thumb of a new U. S. agency.

"This may not have been the intent of the author of the bill, but it is quite probable this would be the effect, unless the bill is properly modified," said Mr. Dennis.

CAA Photo

These members of the Enlisted Reserve Corps are receiving instruction at the Georgia School of Technology. Under the Thomas Bill, ex-servicemen would be given guidance before entering training so that their aptitudes and the job opportunities would be given consideration before schooling began.

The danger suggested by Mr. Dennis may arise if duplicate agencies are set up within the states to promote the ex-soldiers' education. Such agencies, in fact, are suggested by the Osborn Report. But the Thomas Bill does not specifically recommend them. And Washington officials will insist that the new program shall be channeled through established state and local educational boards and departments.

No teaching or training equipment, no facilities, no hiring of teachers or supervisors or reporting system are provided for or even mentioned in the bill. In this respect, the veterans' program would differ from the vocational training for war-production workers. And whereas the VTWPW was designed to aid war industry, the proposed program seeks primarily to aid the individual. Because of this, no new NYA or CCC should grow out of the proposal, according to the most informed Washington opinion.

The Thomas Bill proposes only a partnership between the individual and the school he selects. And each school will succeed only as it can attract the largest possible number of veterans, who decide to come of their own free will, guided only by the advice of trained counselors.

What fate awaits the bill? Will it be enacted into law? Best collective judgment is that it may be placed on the statute books before the Spring offensives against the Continent. In other words, the morale-building value of the bill for our fighting men is not overlooked.

But S. 1509 seeks primarily to help the nation convert to peace. And in the words of the Commander in Chief, "the time to prepare for peace is at the height of war."

Mr. Roosevelt adds: "We must replenish our supply of persons qualified to discharge the heavy responsibilities of the postwar world. We have taught our youth how to wage war; we must also teach them how to live useful and happy lives . . ."

This is the challenge to the vocational schools of the country proposed by the Thomas Bill for training and educating exservicemen and women.

● ARMY equipment in the custody of salvage officers is now being made available to training agencies participating in the preinduction training program, according to the Civilian Preinduction Training Branch of the U. S. Army. The following items have been listed as available: airplanes, wings, control surfaces, gliders, fuselages, landing gear and wheels, instruments, engines, electrical equipment, carburetors, motor vehicles and parts, machine tools, and other items. Application forms should be secured from state education departments.

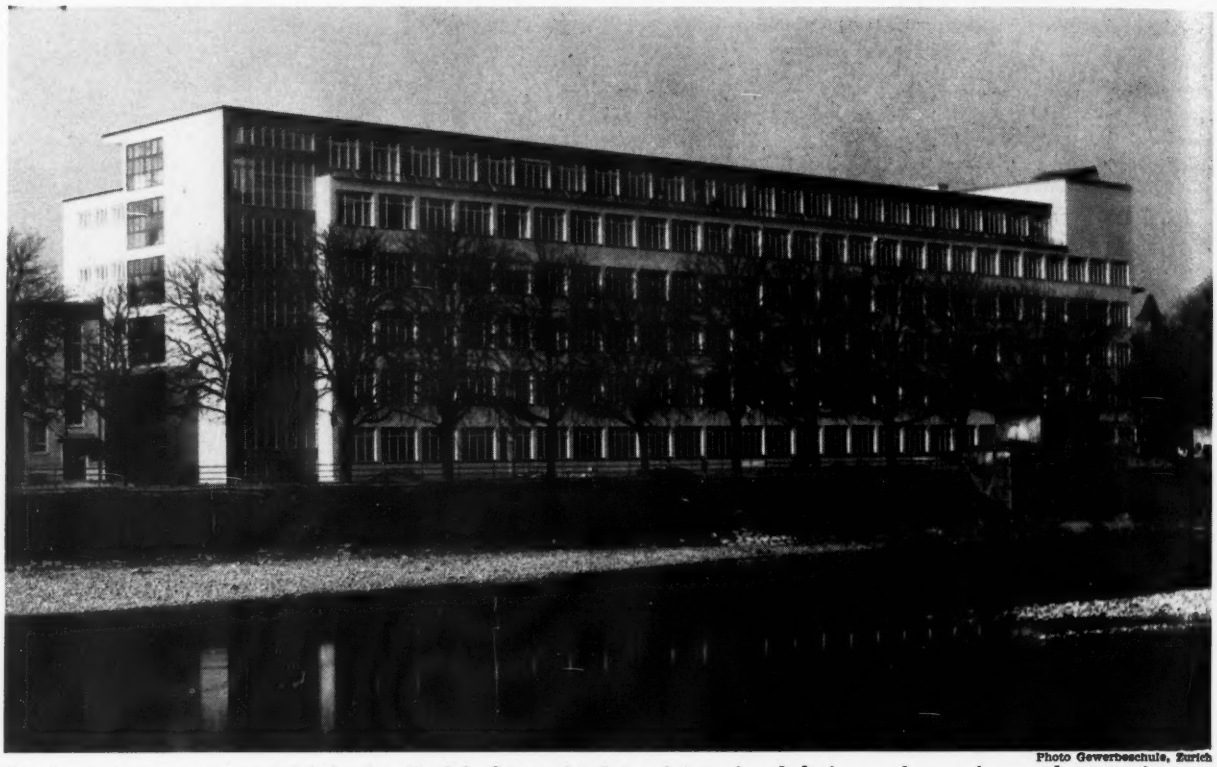


Photo Gewerbeschule, Zurich

The imposing new Industrial School at Zurich, Switzerland, is of functional design and contains modern equipment for vocational training.

Industrial Education in Switzerland

BY *E. Jucker*

There is some similarity between the methods used for encouraging vocational education in Switzerland and in this country. Federal aid is given but the primary responsibility rests with local educational authorities. Increasing emphasis is being given in Switzerland, as in this country, to the dignity and worth of industrial pursuits.

WHEN the rule of the ancient guilds came to an end in Switzerland, and when freedom of trade and commerce was introduced as an aftermath of the French Revolution, some far-sighted Swiss statesmen and educators realized at once that the overthrow of the old order had not only brought advantages in its train, but also certain dangers. Pestalozzi, the pioneer Swiss educator, and his disciples —among whom especially the Bernese philanthropist Emanuel de Fellenberg— declared emphatically that trade and industry could only prosper if all the young people were brought up systematically to work efficiently and to enjoy work as such. Fellenberg demanded over a hundred years ago that young people be given professional training and that the state should establish consulting centers for them and their parents.

The demands of Pestalozzi and Fellenberg were supported by the Swiss Society for the Promotion of Social Welfare, and for half a century they were sponsored on a purely private basis by certain trade associations, private firms, and societies. Towards the end of the 19th century this private initiative began to receive the support of certain cantons, until federal legislation was introduced to form the foundation of the laws that govern the system of apprenticeship today.

In 1930 a federal law was introduced to regulate professional training for trade, industry, and commerce. It is still in force today and pays tribute to the efforts made in this direction for over a century by the Swiss commercial enterprises. This law provides rising professional generations with an extensive and methodical training, and trade, industry, and commerce with large numbers of skilled workers capable of doing that high-class work which is necessary to compete in the world's markets.

About 200 professional consulting centers advise young people about to leave school as to the profession they ought to select; this after a careful study of their abilities and ambitions. Although the influence of these vocational guidance centers is quite imperceptible to the individual young person it has a very marked effect on a well-balanced distribution of labor among the various trades and industries. It is for this reason that these centers maintain very close collaboration with the official labor exchanges. They place more than half of the available number of apprentices, and are thus in a position to improve apprenticeship conditions and to eliminate unsuitable masters. By means of numerous and richly endowed scholarships, children of poor parents have an opportunity to serve excellent apprenticeships.

Professional training is given the greatest possible attention throughout Switzerland. In most of the male professions an apprenticeship lasts from three

to four years; girls are trained in the course of two to three years. In the agricultural field, professional training lasting from one to two years has just been introduced, for the time being under private sponsors.

Each apprentice strives to attain a certain standard of efficiency set by official regulations and he is anxious to successfully pass the final examination. This test is quite severe and both apprentices and masters are obliged to work hard in order not to fail. Those who have passed the examination are given a Federal Certificate.

Capable workers, especially those who aim for advancement or independence, pass a masters' test after a few years of practical work. Gradually only masters who have passed this examination and are thus authorized to use this title will obtain permission to train apprentices.

The special courses for apprentices are compulsory. The well-organized professional schools, directed by excellent teachers, are the pride of Switzerland. They train the future worker and employee in the indispensable theoretical knowledge of draftsmanship and mathematics, special professional knowledge, and organization. They also teach them the essential elements of political life. In the larger towns and industrial regions there are special buildings for this purpose; in agricultural districts adequate space is provided in the regular school buildings.

Le Locle in the Neuchâtel Jura, Switzerland, is proud of its Technicum where watchmakers receive their training.

Workshops, trade museums, and exhibitions serve to supplement the practical training and to apply theoretical knowledge gained in the schools to practical work. For agricultural training, special schools with model farms were established decades ago in all parts of the country. Special professional schools have also been provided for the rising commercial generations. Expenses for all these training centers are borne by the communities and the cantons; they are also subsidized by the Confederation.

For the training of technicians and scientists, Switzerland has provided a large number of colleges, seven universities, and a Federal Institute of Technology.

The effects of this systematic professional training are making themselves felt everywhere. Manual work is no longer looked down upon. Most young people are again proud to learn some handicraft and to become accomplished in their chosen vocation. Work and professional achievement are no longer considered merely as a means for personal advancement, but also as a fine duty towards the nation.

Provisions have also been made for the leisure hours of boy and girl apprentices. Thus the "Pro Juventute" foundation, whose object is the welfare of Swiss youth, has in the course of 20 years opened a large number of workshops and libraries where these young people may spend their leisure hours. It has also introduced competitions for work done in spare time.

The harmonious collaboration between federal, cantonal, and communal authorities on the one hand, and professional associations, juvenile groups, and welfare institutions on the other have made it possible for Switzerland to build up a professional training system which will have a decisive influence on the nation's moral and economic welfare for many years to come. On behalf of the government, this work is directed by the Federal Office for Industry, Trade, and Work. The private organizations, which include professional associations, welfare institutions, firms, and schools, have been united under the patronage of the Swiss Association of Consulting Centers for Professional Training and Apprentices' Welfare.

Pupils of a Boys' School in the Toggenburg near St. Gall, Switzerland, decorating boxes which they have made in shop classes.

Photo C. Schildknecht, St. Gallen

Adjustable Chuck Board

BY *C. F. Fitz*

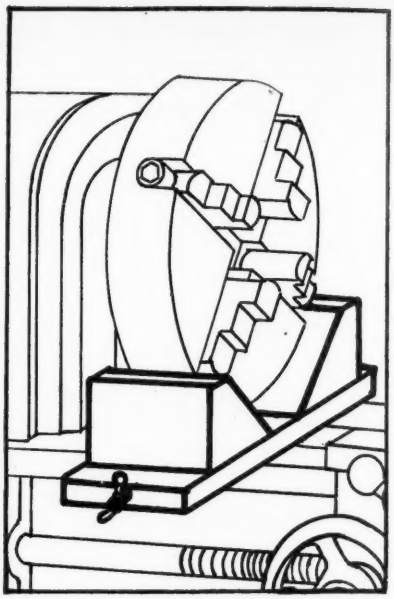
Machine-shop instructors will find this device handy to protect the lathe ways, the student, and the chuck. The construction of the project requires the coordination of the metalworking and woodworking departments and involves a number of tool processes. The author is a member of the Industrial Education Department of the Lancaster, Pennsylvania, public schools.

TESTED INSTRUCTIONAL PROJECT

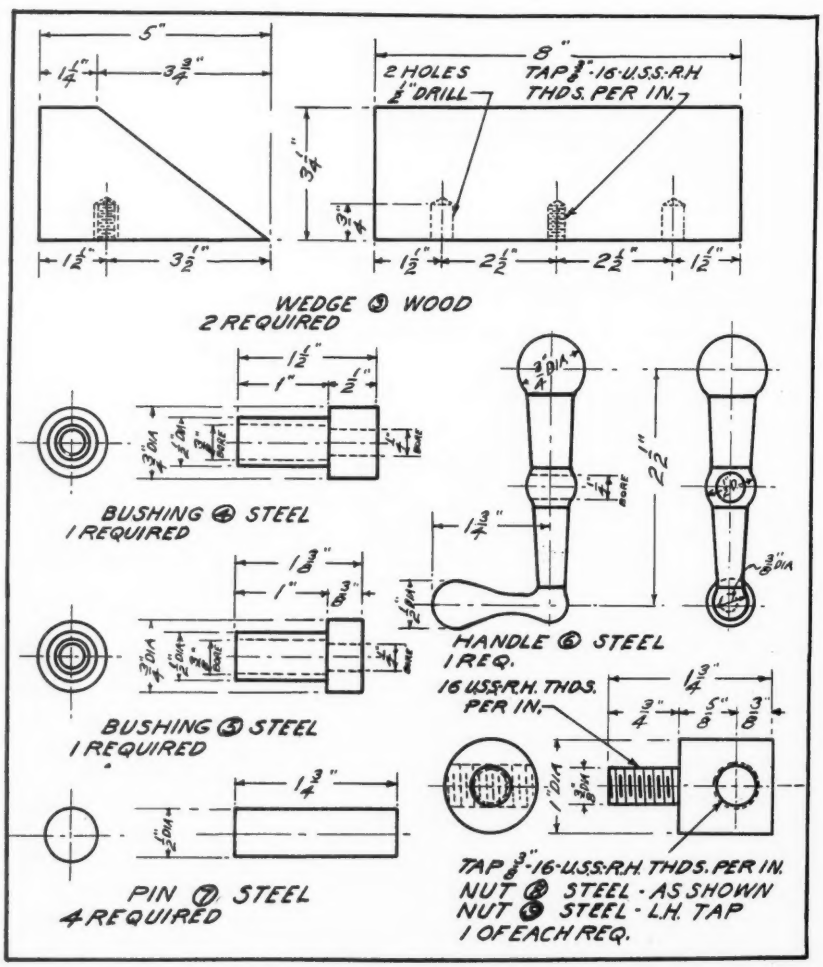
IN our shop equipment are included several different sizes of chucks for each lathe. Some of these chucks are large, heavy, and hard to handle, especially when an operator is trying to thread one onto the spindle nose of the lathe. To eliminate this difficulty, save time, protect the ways of the lathe, and preclude the possibility of accident, the chuck board shown in the illustration was designed.

To use, the board is placed in position on the lathe bed, the chuck is lifted onto the board, the screw in the board is revolved until the adjustable jaws have raised the chuck into line with the spindle nose, and the chuck is threaded onto the spindle by the usual method of pulling the belt.

As shown by the drawings, Figures 2 and 3, the board proper is 8″ wide by 18″ long and 1¼″ thick. Each jaw is 3¼″ high. A hole through the center of the board, lengthwise, provides for the screw by which the jaws are fed toward or away from the center. The screw, which is threaded ⅜″ 16 thread R. H. on one end and ⅜″ L. H. on the other end, is held in alignment by two bushings, one at each end of the screw. The bushings are made to fit into holes in the ends of the board and are bored and reamed to fit shoulders on the ends of the screw, where they are anchored with setscrews.

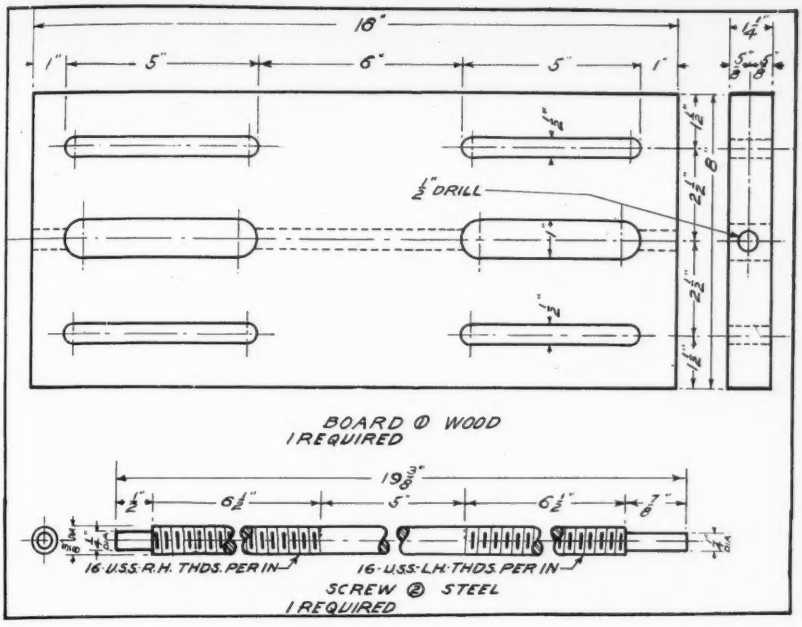


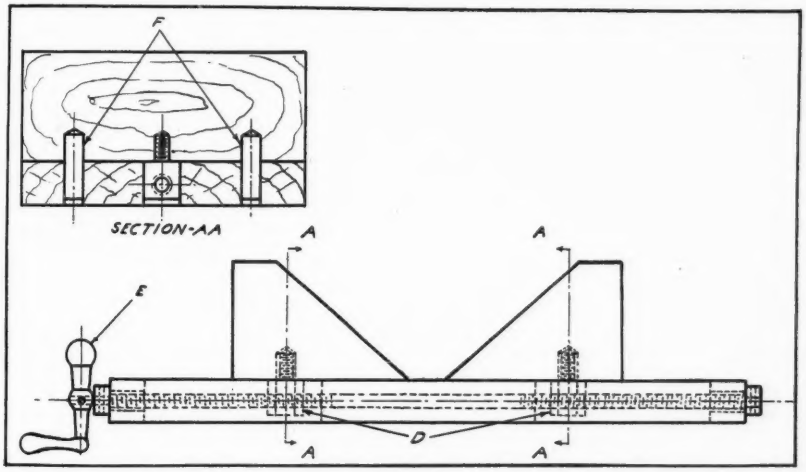
The jaws are maintained in alignment by two pins in the under side of each jaw, the pins projecting downward into slots in the board. The pins are indicated at *F* in Fig. 4. Also projecting downward from the center of the bottom face of each jaw is the part *D*, which is threaded to screw into a hole in the bottom of the jaw and is drilled and threaded to fit the thread on the screw. Thus when the screw is revolved by the crank handle *E*, the jaws are fed toward or away from each other.

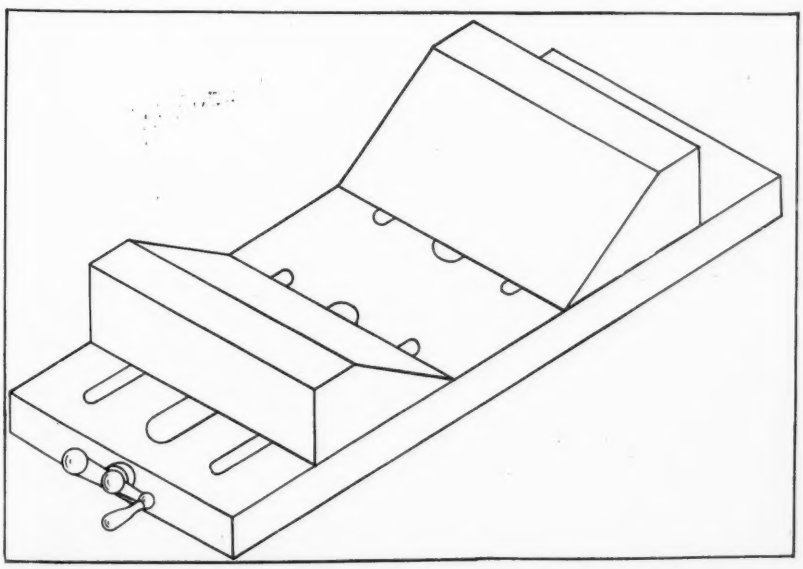


BILL OF MATERIAL

1 piece of maple 1¼″x8″x18″
2 pieces of maple 3¼″x8″x5″
1 piece of C.R.S. ⅜″ dia. x 19⅜″
1 piece of C.R.S. ¾″ dia. x 1½″
1 piece of C.R.S. ¾″ dia. x 1⅜″
4 pieces of C.R.S. ½″ dia. x 1¾″
2 pieces of C.R.S. 1″ dia. x 1¾″
1 piece of C.R.S. ¾″ dia. x 2½″
1 piece of C.R.S. ½″ dia. x 2″







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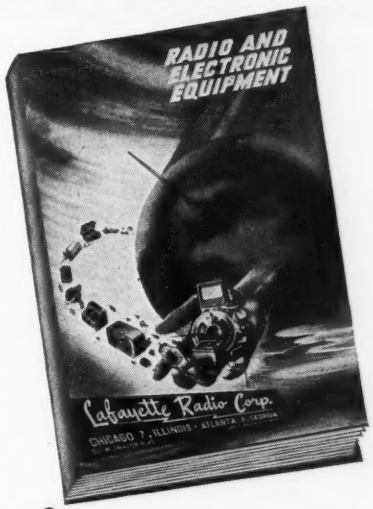

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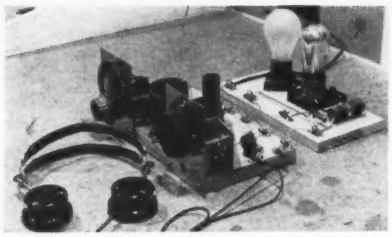


Figure 1.—One-tube radio set connected to the power supply. Notice simplified wiring and compactness of unit.

Radio Power Supplies

BY *Ralph O. Williams*

The lack of radio "B" batteries and transformers can be overcome and excellent instructional objectives met through the construction of the power supplies described in this article which supplements the same author's article in the November SCHOOL SHOP. Ralph O. Williams teaches radio at Western Michigan College of Education, Kalamazoo, and has had many years of commercial and amateur radio experience.

TESTED INSTRUCTIONAL PROJECT

TEACHERS of electricity and radio will find that the power supplies herein described fill a long felt need for a simple, inexpensive, and easy-to-build source of direct and alternating current for the operation of radio sets, amplifiers, and other electrical devices about the school shop.

The problem of supplying power to the large number of individual projects in radio or electronics classes is particularly acute at this time due to the shortage of radio "B" batteries and power transformers. The following information is presented in the hope that it will alleviate this difficulty and encourage the use of a greater number of inexpensive units and thus give more students first-hand experience in classes where formerly the number of students per project was too large and experimental set-ups were limited by the scarcity of adequate power supplies.

The simple power supply on the wood baseboard of Figure 2 was especially designed for the one-tube radio set described in the November, 1943, issue of SCHOOL SHOP and shown here in Figure 1. Aside from its instructional features, this power supply may also be used to provide current for calibrating direct-current voltmeters and milliammeters, the operation of vacuum-tube voltmeters, ohmmeters, bridges, radio-frequency oscillators, code-practice tone sources, and in fact any application requiring low-voltage alternating current and well filtered high-voltage direct current.

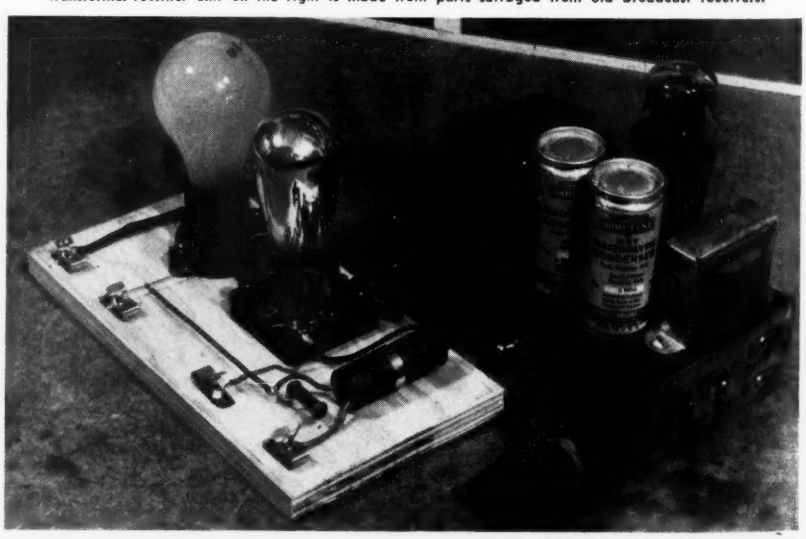
The conventional power supply, on the metal chassis of Figure 2, is constructed from parts taken from old broadcast receivers. Both of these units are modern versions of the "B" battery eliminator of many years ago.

Conventional Power Supply—Theory of Operation

Figure 3 is a circuit diagram of a conventional power supply as used in many broadcast receivers and shown rebuilt on a metal chassis in Figure 2. This unit supplies low-voltage alternating current for operation of filaments at the terminals marked *H*, and high-voltage direct current at terminals marked *HV* + and —. If desired, a voltage lower than the maximum may be obtained from a sliding tap on the bleeder resistor. The source of power is the regular 115-volt alternating current in the shop.

When the switch is turned on, alternating currents from the power line surge back and forth through the transformer primary winding, magnetizing and demagnetizing the soft iron core material at the power-line frequency (60 C.P.S. in most localities). The changing state of magnetization of the core material, by changing the number of lines of force through the secondary windings, induces currents in them. The potential existing across the secondary winding is a function of the number of turns as compared to the primary turns. Induced voltages are directly proportional to the number of turns. This transformer has a turns-to-voltage ratio of 5 to 1. The 5-volt secondary heats the filament of the rectifier tube while power from the 6.3-volt secondary is transferred to the filaments of the receiver through the external connections *H*—*H*. The high-voltage secondary is center-tapped. Considering the center tap to be at zero, potential P_1 is plus when P_2 is minus. By electromagnetic induction, electrons are forced down away from P_1 toward P_2 giving P_2 a surplus and leaving P_1 with a deficiency. The deficiency at one terminal is as great as the surplus at the other, which is another way of saying that the voltages are equal but opposite in sign. When heated sufficiently the filament gives off electrons which surround it in the form of an electronic cloud. The electrons will be attracted to the plate where there are too few but not to the plate where there is already an electron surplus. This condition lasts for only a half cycle of alternating current after which the situation reverses and the opposite plate becomes positive and attracts electrons, thus rectification takes place with electrons going out of the transformer center tap and coming back through the filament, first to one plate and then to the other. This system is called a *full-wave* rectifier. The currents leaving the center tap consist of successive half waves of pulsating direct current which are changed to pure direct current by the action of the filter. The filter consists of the choke L_1 and condensers C_1 and C_2. Variations in voltage coming from the rectifier are smoothed out almost completely by the action of the choke and condensers in a "brute-force" filter arrangement as

Figure 2.—The simplified power supply on the left costs less than two dollars to construct. The conventional transformer-rectifier unit on the right is made from parts salvaged from old broadcast receivers.



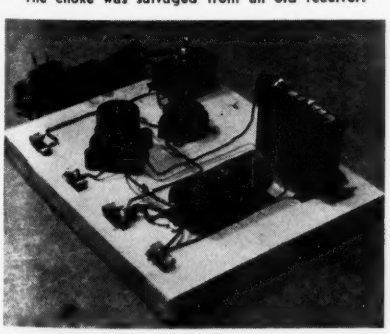
shown. Under conditions of no load, the voltage delivered by the filter will be 1.4 times the R.M.S. of the alternating-current high voltage. The "bleeder" is placed across the output of the unit to drain off enough current so the condensers will not be charged to the peak value of the high voltage and later destroyed.

The resistance of a bleeder is calculated so it will drain off about 10 percent of the total current-delivering capacity of the power supply. Since ordinary radio-receiver transformers are designed to deliver from 40 to 150 milliamperes, the bleeder should be adjusted to carry from 4 to 15 milliamperes depending on the transformer used. It is quite safe to use 25,000 ohms with a standard broadcast receiver transformer selected at random.

Instructional Features

The construction of either power supply provides the student with experience in making good electrical and mechanical layouts, mounting parts, and wiring according to instructions. When the power supply has been constructed, it must be inspected for correct components and connections. When the student is satisfied with the correctness of all connections, he may turn on the switch and check the electrical operation of the unit. He may measure the high voltage with a high-range D.C. voltmeter having an internal resistance of from 200 to 1000 ohms per volt. The filament voltage may be measured with a low-range A.C. voltmeter. A milliammeter may be inserted in series with the bleeder to measure the current through it. A variable resistor may be connected to the high-voltage output terminals and the voltage measured across it as its resistance is changed from around 5000 ohms upward. By Ohm's Law, the current through it can be calculated and thus, by plotting output voltage against output current, the student can secure data

Figure 4.—Simplified power supply similar to the one in Figure 2 but having a power switch and using a filter choke in place of the resistor. This unit has slightly better voltage regulation and filtering action. The choke was salvaged from an old receiver.



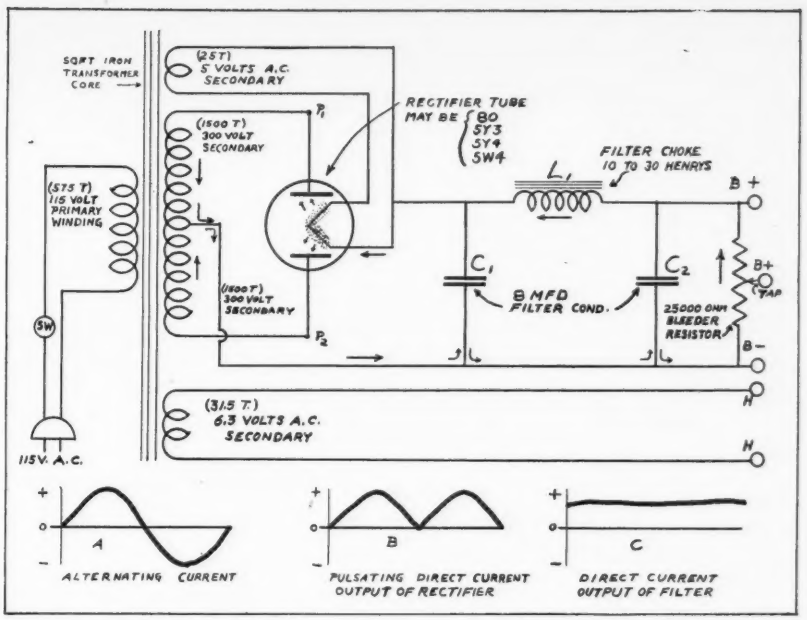


Figure 3.—Schematic wiring diagram of conventional power supply shown in Figure 2. The arrows indicate direction of electron flow through the circuit.

for a table indicating its voltage regulation. When the power supply is connected to the radio receiver, the action of the filter may be checked by removing the wires to the condensers one at a time or both at once and noticing the effect on the hum in the headphones. The choke may be short circuited to see if it affects the hum. If a voltmeter is connected across the output terminals of the power supply, it should reveal the effect of the condensers and choke on the output voltage, both with and without load. It is also suggested that the filter be disconnected at points *A* and *B* and the voltage measured with a D.C. voltmeter and, with the meter still connected, connect a condenser across the meter and note the rise in voltage. This is explained by calling the student's attention to the waveform of the rectified alternating current and the fact that the mechanical inertia of the meter movement prevents its going up to maximum on the peaks, but the condenser placed across the meter is charged by the peaks faster than the current will leak off through the meter resistance and the meter reads the voltage of the charged condenser. The directions of the currents in the various wires may be checked.

Electrical measurements should prove to the student the truth of Ohm's Law when he figures the bleeder resistance and observes its current and voltage. If the addition of a resistive load of 5000 ohms to the output terminals causes the voltage to drop quite a bit, the student must be informed that the voltage is not lost but has been divided differently among the various components having resistance, and that Kirchhoff's Laws still hold. Proof of this can be had by measuring the resistances of the choke, secondary winding of the transformer, and vacuum tube. It will be found that a voltage drop across the output results in a redistribution of voltages around the closed circuit. If an assortment of extra filter condensers is available, various capacities might be substituted for C_1 and C_2 and their effect on voltage and filtering action observed. Chokes of various inductances will act differently in this circuit. Students should be encouraged to try, with the help of the instructor if necessary, to account for the above observed phenomena in terms of their basic knowledge of electricity and magnetism.

The Simple Power Supply

The power supply shown in Figure 4 was a first attempt at the design of a simple and inexpensive source of current for the operation of the one-tube set described in the November issue of SCHOOL SHOP. It consists essentially of a 40-watt light bulb to limit the current through the filament of the tube and a 201-A tube connected as a rectifier across the voltage drop of the lamp. The switch is in the 115-volt circuit and the choke and condenser constitute the filter system. This unit worked perfectly as a hum-free source of current and enabled the operator to tune in stations as well as though batteries had been used.

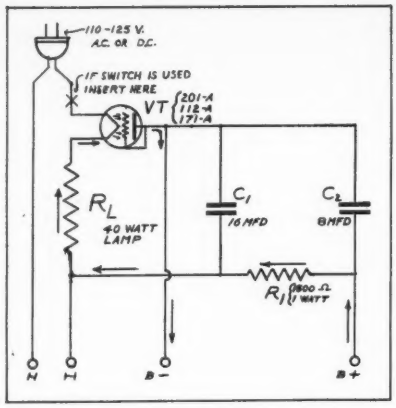


Figure 5.—Schematic wiring diagram of simple power supply. This represents the least expensive source of power for one- and two-tube receivers. The output voltage is around 100 volts with adequate filtering for currents up to 10 and 15 milliamperes.

An effort to simplify the unit further resulted in the final product shown in Figures 1, 2, and 6. The completed unit is mounted on a piece of five ply and costs less than two dollars complete. Figure 5 is a schematic wiring diagram of the unit illustrating the theory of operation. The filament of the rectifier tube (201-A) and the heater of the tube in the radio set (6SJ7) are in series with the 40-watt lamp R_L. The 201-A filament requires .25 amperes for its operation and the 6SJ7 requires .3 amperes. An ordinary 40-watt, 115-volt lamp will limit the current to approximately .333 amperes. Experiments indicate that the combination is satisfactory and measurements showed the voltage on the 6SJ7 to be normal while the 201-A was running a little high. A continuation of the experiment indicated a long life for the 201-A in spite of the slight overload. (It took 25 volts to burn out the filament of a 201-A!) The tube is connected as a diode, that is the plate and control grid are tied together. The rectifier is so arranged that it receives its voltage from the potential drop across the lamp R_L. The two condensers and the 1500-ohm resistor R_1 constitute the filter which is adequate to smooth out the impulses from the half-wave rectifier to the extent that they are not noticeable in the headphones. If a choke coil is available, it should be inserted in place of the resistor; a higher voltage and better filtering will result. The condenser is a small tubular electrolytic dual unit containing both an 8- and 16-microfarad unit. The mechanical layout and wiring are illustrated by Figure 6. If it is desired to use the unit for a direct-current source, only the terminals marked *H* will have to be connected together to preserve continuity of the filament circuit for the rectifier tube. The arrows show the direction of electron flow in the circuit. When connected to the one-tube set as shown in Figure 1, the power pack delivered 110 volts direct current to the plate circuit at 6.6 milliamperes and the set operated nicely.

Safety Hints

In the interest of cheapness, the set contains no fuse. A fuse may be inserted on the chassis, or a low-value fuse placed in the regular shop fuse box if deemed necessary. *Do not ground the set*—it is automatically grounded through the power source. If it is felt necessary to ground the chassis, do so through a condenser of .001 microfarads or more capacity. If a test light is available, the pack can be plugged into the socket so the set is not "hot" to touch. An accidental ground may burn out the 6SJ7 or the 201-A but will probably do no other damage.

The potential difference between the heater and cathode of the 6SJ7 will be equal to the plate voltage. The circuit has been arranged so it is *not* equal to the *inverse-peak* voltage. Experiments with a large number of 6SJ7 tubes indicate that this method of operation is safe and that breakdown between heater and cathodes is unlikely.

Mishandling any powerpack may result in an occasional harmless shock to the operator. Inverse-peak voltage in an ordinary broadcast receiver may exceed 980 volts, yet they are not considered dangerous to work on because of the small currents involved.

Conclusion

In ordinary times one would adhere closely to the transformer-type power supply because of its better voltage regulation and greater voltage capabilities.

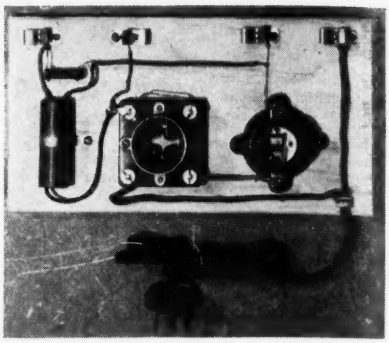


Figure 6.—Layout and wiring of power supply. Changes in physical size of components would alter arrangement. The baseboard is 5" x 10". All parts secured with wood screws.

However, under the present circumstances, the acute lack of almost everything in the radio line is apt to curtail our activities. It is in the interest of expanded activity and greater use of the shop in radio and electrical courses that the simple power supply was developed. Should any teacher have difficulty with the construction or operation of any of the equipment described in this or any other similar article by this author, a detailed letter describing the trouble will receive a prompt and complete reply.

Bibliography

Additional information on power supplies may be found in one or more of the following references:

1. *Radio Amateurs Handbook—Defense Edition,* by American Radio Relay League, Hartford, Conn.
2. *Radio Engineering Handbook,* by Keith Henney, McGraw-Hill Book Co.
3. *Fundamentals of Radio,* by W. L. Everitt, Prentice Hall.
4. *Elements of Radio,* by Marcus and Horton, Prentice Hall.
5. *R.C.A. Receiving Tube Manual RC-14,* Radio Corporation of America, Harrison, N.J. Price 25c. (Circuits and tube data, best buy.)

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● UNDETERRED BY transportation difficulties, approximately 1700 registered members were in attendance at the American Vocational Association War Work Vocational Training Conference at Chicago December 14 to 17. The Association formally went on record as advocating the return of the vocational rehabilitation program to the vocational division of the U. S. Office of Education; that the states inaugurate effective planning for postwar programs in vocational education which will include effective training and adjustment for the returned soldiers, for the millions of war-production workers who may need additional training or retraining for peacetime occupations, and for all those who will face readjustments in family life; and that instead of providing tuition payments to educational institutions for exservicemen that funds be appropriated through the U. S. Office of Education to be alloted to the respective states and state boards specifically responsible for the various types of education.

The new president is John A. McCarthy, assistant commissioner of education for New Jersey. The Treasurer is Charles W. Sylvester, director of vocational education for Baltimore, and George H. Fern, state director of vocational education for Michigan, was elected vice-president for industrial education. Ralph H. Woods, state director of vocational education for Kentucky, was elected president of the Association of Officers of State Vocational Associations. The convention will be held in Philadelphia next year.

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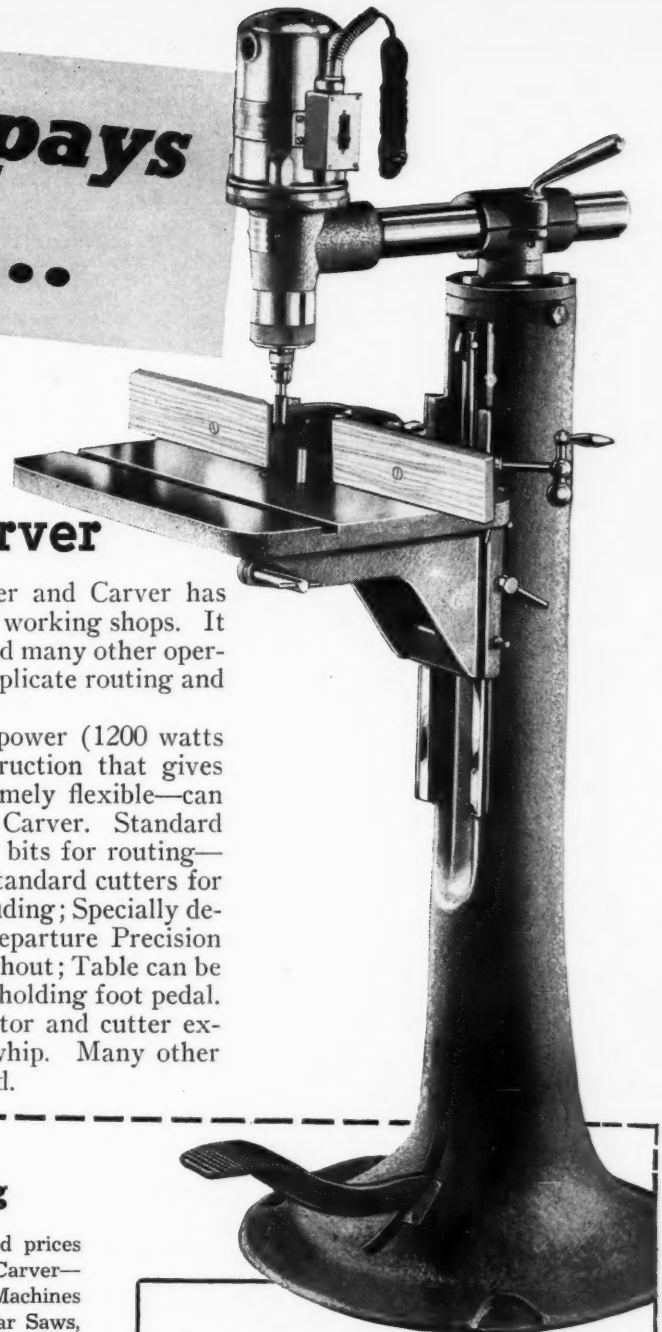

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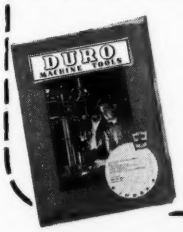

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A Problem in Deck Fittings

BY *August Flam*

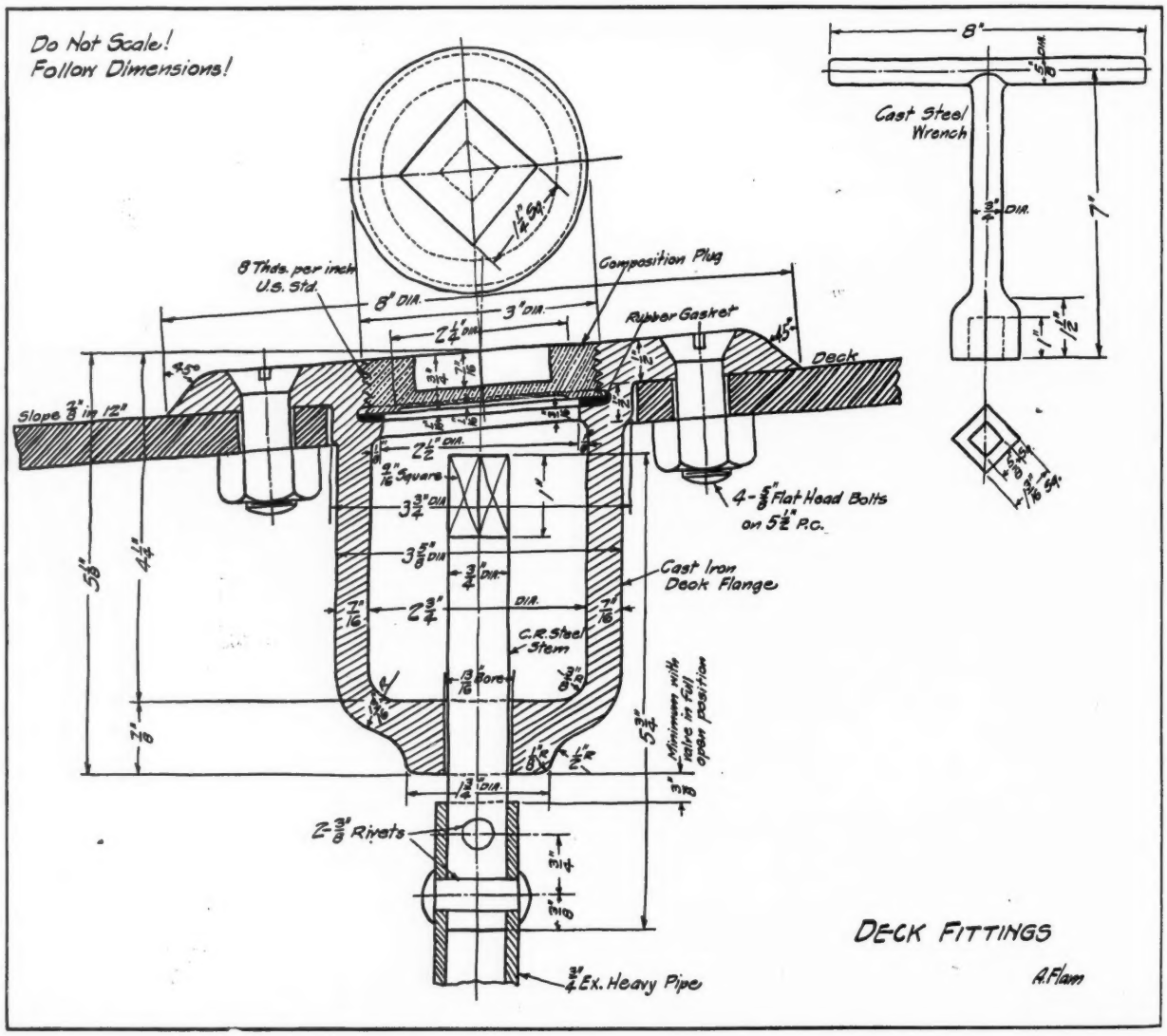
This article presents an out-of-the-ordinary approach to a problem in drafting. Stimulating interest by using an actual mechanism from a Liberty ship, the problem calls for a detail drawing, a bill of material, and an application of trigonometry. August Flam teaches drafting and is head of the Industrial Arts Department, John Marshall High School, Los Angeles, California.

IT is usually desirable on board ship to arrange for control from convenient deck levels. Certain accessories which are far below decks are therefore inaccessible. Deck fittings for an overboard discharge valve, located in the hold, but controlled from the deck, are shown on the problem sketch. These fittings have been actually used on cargo ships built for the U. S. Government.

The arrangement shows a portion of a $\frac{3}{4}$" extra heavy pipe, near the bottom of the figure. The end of the pipe shown is rigidly fastened to the valve stem extension piece by means of two $\frac{3}{8}$" rivets. This pipe is a part of a system of several lengths of pipe and universal joints by means of which the actual stem of the valve, located somewhere in the hold, is operated. The valve-stem extension marked "C.R. Steel Stem" has its upper end machined to a 9/16" square for a length of 1", and is enclosed in a flanged shell, marked "Cast Iron Deck Flange." This shell is passed through a hole cut in the deck and fastened to the deck plates by means of four $\frac{5}{8}$" countersunk head bolts. The upper end of the deck flange is sealed by means of a composition plug, bearing on a soft rubber gasket. Both plug and gasket are clearly indicated on the figure. The plug is provided with a $1\frac{1}{4}$" square recess 7/16" deep in its top, into which the outer square at the bottom of the wrench, shown at the right, is machined to fit.

When it is desired to operate the valve, the end of the wrench is inserted into the square hole on top of the plug, which is threaded. When the plug is removed, the top of the square valve stem extension is exposed, thus making it possible to engage the square hole in the end of the wrench, with the square end of the stem extension, and, by turning the wrench, open or close the valve.

The problem consists of making a detail drawing of the deck fittings, and call for all the material in a suitable bill



of material. This list is usually placed directly over the title (as shown below) and is generally in the lower right-hand corner of the drawing. The bill of material should include such standard parts as bolts, nuts, etc., which need not be actually drawn on the sheet, but which can be adequately described.

There may be some question in the case of the gasket used in this problem whether it should be detailed or called for in the bill of material. It has been assumed in the bill of material herewith given that the student will actually draw the gasket, but should it be desired not to, then it could be called for in the bill of material by the statement in the "Name & Descr." column: Gasket 3¼" O.D. 2½" I.D. x 1/16" thk. The initials, O.D. and I.D., and the abbreviation, thk., are known and recognized by shopmen.

The bill of material is commonly made in such a way that parts may be added to the drawing without disturbing the other pieces on the sheet. Each piece should be given a part number, and the parts listed beginning with No. 1 at the bottom and going upwards, as shown in the illustration:

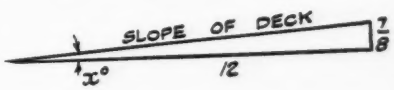
PART NO.	NAME & DESCR.	NO. REQ'D	MATERIAL
8	ROUND HD. RIVET 3/16 DIA. x 1 1/16 LG.	2	STEEL
7	STD. HEX. NUT 5/8"-11	4	STEEL
6	STD. CSK. HD. BOLT 5/8"-11 x 1 3/16 LG.	4	STEEL
5	GASKET FOR PARTS 1 & 2	1	RUBBER-SOFT
4	WRENCH	1	CAST STEEL
3	VALVE STEM EXTENSION	1	C.R. STEEL
2	PLUG FOR PART 1	1	COMPOSITION
1	DECK FLANGE	1	CAST IRON

DECK FITTINGS

There is still another advantage in listing the parts in the order shown. If a change should be made on one of the parts, involving considerable erasing, that part may be better cancelled by having a few lines drawn through it and a new part added with a new number at the top of the list.

No finish marks have been indicated on the sketch, but a careful study of how the parts fit together should enable the student, with but little help from the instructor, to decide which surfaces should be machined. While sufficient clearance has been allowed on both the inside and outside squares of the wrench for engaging the plug, and the top end of the valve-stem extension, it is inadvisable to depend on unfinished surfaces for the type of fit here required.

Referring to the calculation of the angle for the deck flange, the student who is familiar with the use of the tables of natural trigonometric functions will have the advantage over those who have no such knowledge. The teacher has an opportunity to introduce and explain in an elementary form how a draftsman would find the angle. This is simple enough, as shown below:



$$\frac{7}{8} \div 12 = \text{TAN } x$$

$$\text{TAN } x = \frac{.875}{12} = .07292$$

$$\therefore x = 4°\text{-}10'$$

The angle of 4°-10′ should be given on the detail, rather than the deck slope, which is indicated on the sketch.

This problem is of second- or third-year drafting level, and students of that grade should experience no difficulty with it. *(Continued on page 25)*

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What Do You Think?

What postwar changes, if any, do you anticipate in the industrial education program?

Says L. H. Dennis, Executive Secretary, American Vocational Association:

The postwar vocational education program must be broadened in many ways. Future developments must provide for a greater variety of vocational training opportunities. Provision must be made for expanding the vocational program in the posthigh-school field of service, in both vocational and vocational-technical types of instruction. Undoubtedly this may involve the development of certain types of administrative units within the present school systems to make possible an area vocational-technical type of school. These schools, conducted in accordance with our present democratic system of decentralized vocational schools operated under the control of state boards for vocational education and local school districts, should completely eliminate need for the separate establishment and maintenance of federally operated vocational training projects.

Says Marshall Byrn, Assistant Professor of Vocational Education and head of the Department of Industrial Arts, University High School, University of Michigan:

1. *There will be greater emphasis on the teaching of technical aspects of industrial arts subjects.*—Recently I had the pleasure of spending a day at one of the best motor mechanics' schools in the Army. From the major in charge on down, the complaint was that practically none of the boys had a suitable background in the elementary technical fundamentals such as a workable knowledge of electricity, elementary physics and chemistry, and an elementary understanding of metals and alloys used in motor construction. Apparently the size of the high school from which they came made little difference in adequate preparation in fundamentals. One lieutenant said, "Apparently all they have learned in school is to take 'em down and slap 'em back together again; but that doesn't go in the Army." I am convinced that in most schools the shop instructor must become well enough trained in physics and chemistry to teach the information necessary to insure adequate background in these fields.

2. *Much more emphasis will likely be placed on the importance of better technics in the proper use of hand tools in metalwork.*—Another instructor at the Army school said, "Why don't you teach your boys how to use the common hand tools correctly? Watch this group of new recruits. They just came in yesterday. Not one out of ten can use the common tools correctly. I mean hacksaws, drill bits, chisels, and hammers." Perhaps he has something there. I felt all the time as if he were taking it all out on me. I do think that we will all want to do a little better job in this respect also. I surely am going to try.

3. *Greater emphasis will be placed on teaching pupils how to plan and execute projects made in the shop.*—Better planning and execution of plans are dependent on sound technical training plus the correct use of common tools. "A job properly sketched and planned is more than half done." Far too little emphasis is being placed on this important phase of industrial arts.

4. *More stress will be placed on the pleasures and satisfactions that surely follow knowing "how and why" in industrial arts work.*—Just making something may be fun; sheer joy comes only when a boy feels the thrill that comes from a fine understanding of both the technical and craftsmanship aspects of the project being made.

5. *More careful selection and better training of industrial arts teachers will be a likely outcome of our war experiences.*—A good shop teacher is born, not made. It is true, however, that when a student has innate aptitudes a teacher-training institution makes a far better teacher of him. In far too many instances, though, all comers have been accepted. It takes a high-grade young man to make a fine shop teacher, particularly if he is to teach in a real general shop. Far, far greater emphasis needs to be, and, I believe, will be placed on giving our prospective teachers in industrial arts a better background in the technical and social aspects of the field. Fine skills in hand-tool and machine processes will continue to be emphasized, perhaps even to a greater degree than at present.

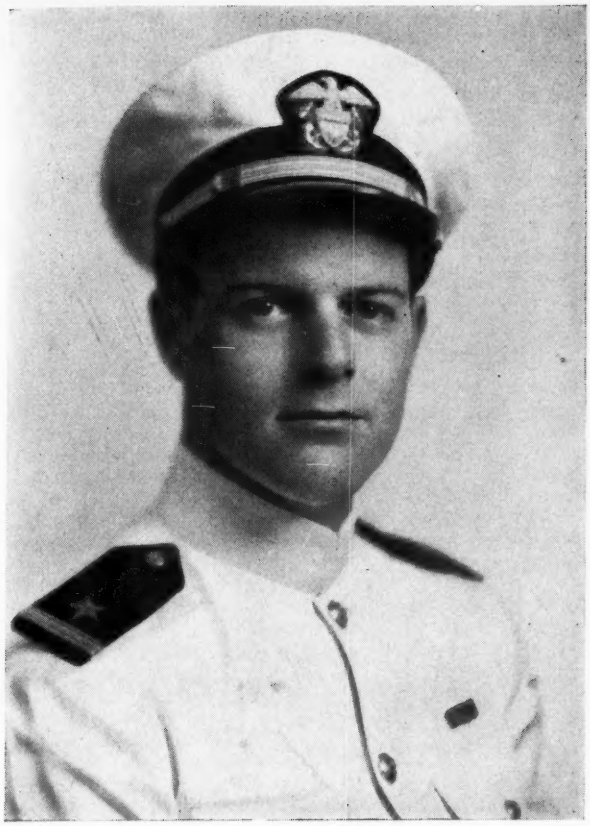
Says John J. Seidel, Deputy Assistant Commissioner for Vocational Education, U. S. Office of Education:

I think, in general, it is agreed that vocational industrial education in the past was limited to vocational education service for those individuals preparing for, or employed in, a skilled occupation. The many rapid changes brought about by the war—because our objectives and thinking are always exceedingly flexible during a war—are making us conscious of greater opportunities and, in my opinion, these opportunities will bring about the following changes: first, a national program of vocational-technical training on a posthigh-school level; second, a greater expansion of practical work experiences combined with school attendance; and, third, an extensive program for those youth who cannot qualify for skilled trade training.

Strictly Personal...

ABOUT YOUR FELLOW TEACHERS

F. THEODORE STRUCK, head of the Department of Industrial Education at Pennsylvania State College, valued member of the Editorial Advisory Board of SCHOOL SHOP, and outstanding leader in the field, died in late November following a brief illness. . . . JOHN G. TERHUNE has joined the faculty of the Evanston Township, Illinois, High School where he is teaching auto shop. . . . New teachers in the Ann Arbor, Michigan, schools this year are CLARENCE HILLEGONDS who teaches woodshop at Tappan Junior High School and formerly taught at Blue Island, Ill.; EUGENE LARSEN, mechanical drawing teacher in the high school, formerly of Springfield, Ill.; JOHN YEAKEL, printing and drawing teacher at Slauson Junior High School, formerly of Mount Morris, Ill.; and RUDY SILVERSTONE, woodworking teacher at Slauson Junior High School. . . . LAWRENCE E. CROSBY has been appointed eastern representative for American Type Founders to assist JOHN A. BACKUS, manager of the Department of Education. Mr. Crosby has been with the Silver Burdett Co. . . . W. T. PICKAVANCE, formerly of Grand Rapids, Minn., has been appointed metal shop instructor in the Albert Lea, Minn., High School. . . . CHARLES R. CRAKES, formerly superintendent of the Washington, Ind., schools, has been named executive consultant on visual education for the De Vry Corp., Chicago, Ill., where he will be available to educators interested in starting to plan, prepare, and equip schools for the predicted postwar expansion of visual training. . . . C. H. WILLIAMS, founder and honorary chairman of the board of directors of the Plomb Tool Co., died in Los Angeles, Calif., on October 31. The company has grown under his leadership from a small concern selling hand tools made in a Los Angeles blacksmith shop back in 1907 to one of the largest manufacturers of its kind in the world. . . . DEWEY F. BARICH, head of the Industrial Arts Department of Kent, Ohio, State University, has been commissioned a Lieutenant (jg) in the Naval Reserve Corps. . . . DONALD GEIGER has been appointed shop teacher at Tiffin, Ohio, Junior High School. . . . WALTER M. ARNOLD of the U. S. Office of Education has been named director of vocational education for Allentown, Penna. . . . EVERETT KAMPEL, head of the masonry trades department at the Hartford, Conn., State Trade School for 14 years, has been appointed a supervisor in the Bureau of Rehabilitation Service of the Connecticut State Department of Education. . . . ROBERT S. LITTEL, Hopewell Township School, Aliquippa, Penn., has been appointed head of the industrial arts department, Freeport, Penna., Borough Public Schools.



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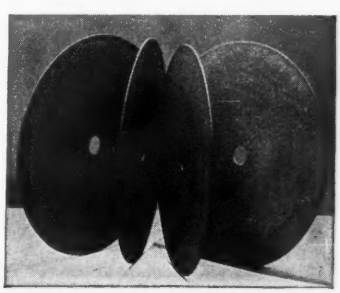

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BOOKS:

Fundamentals of Machines. Obourn and Montgomery. St. Louis, Mo.: Webster Publishing Company, 1943. Pp. 218. Paper bound. 72c.

Written for preinduction training courses in machines and following closely the outline approved by both the War Department and the U. S. Office of Education, this workbook and textbook combined outlines the fundamentals of machines in 14 basic units. Several problems are used in each unit to illustrate the principles, and demonstration and laboratory exercises, references for further study, a summary of important ideas for review, and a mastery test are also included. Suggestions on visual aids, reference books, and demonstration materials are given.

Ellsworth S. Obourn and Gaylord C. Montgomery are heads of the science and mathematics departments, respectively, at John Burroughs School, St. Louis, Mo.

Fundamentals of Electricity. Obourn and Montgomery. St. Louis, Mo.: Webster Publishing Company, 1943. Pp. 194. Paper bound. 72c.

A combination text and workbook approved by the War Department and the U. S. Office of Education for use in preinduction training classes in electricity, this book divides the course into 13 units. Units include demonstration and laboratory exercises, clear line drawings, references, a summary of important ideas for review, and a mastery test at the end of each. Several methods for demonstrating the same concept are often given to permit the teacher to use such equipment as he has on hand. Sections on visual aids, references, suggested equipment, and index.

Ellsworth S. Obourn is head of the department of science and Gaylord C. Montgomery is head of the mathematics department at John Burroughs School in St. Louis, Mo.

Theory and Practice of Arc Welding. Sacks. New York: D. Van Nostrand Company, Inc., 1943. Pp. xii+383. $2.80.

Fundamental theory of arc welding and descriptions of the basic equipment with which a good welder should be familiar are set forth in the first ten chapters of this textbook for the beginner. Part two, an operator's training course, deals with manipulative skills, beginning with the basic operations of striking and holding an arc, and continuing with lessons and questions on all types of joints, in all positions, using shielded arc electrodes. Job sheet form of lesson presentation is used, with a blueprint of each job and photographs and sketches included.

The operator training lessons may be given in their entirety, or if training in a specific operation is desired the lessons directly applicable to it may be used alone to shorten the length of the training period. The book goes beyond the minimum standards for instruction of welding operators set up by the American Welding Society.

R. J. Sacks is supervisor of the welding and machine shops at the Hadley Technical High School, St. Louis, Mo.

Fundamentals for the Aircraft Mechanic. Markley. New York: McGraw-Hill Book Co., 1943. Pp. vii+345. $3.00.

Written as a textbook for a basic course in aircraft mechanics, this book is not intended to be inclusive enough to produce specialists in any of the branches covered. The fundamentals of sketching, blueprint reading, and shop mathematics are given in the early chapters to help the student understand the specialized training set forth in the rest of the book. Most of the systems and materials used in the airplane are discussed in order to give the student a basic understanding of them as well as the simple theory by which they work.

James M. Markley is Supervisor of Mechanics' Training of Eastern Air Lines, Inc.

Industrial Arts in Utah—Handbook. Logan, Utah: Utah State Agricultural College, 1941. Pp. ix+241. Paper bound, mimeographed.

A handbook for teachers to serve as a guide in evaluating and expanding the industrial arts course in order to serve the community. Contains illustrative materials and suggestions for teaching, as well as information on instruction sheets, projects, requisitioning supplies and equipment, and selection of equipment. Lists of equipment for various areas and the source, list of periodicals for both teachers and students. Plans and illustrations of shop layouts. Prepared by a committee of industrial arts teachers at the 1941 summer session.

Engineering Drawing and Mechanism. Brodie. New York: Harper & Brothers, 1942. Pp. xii+241. Cloth bound. $2.25.

The first section of the book contains exercises in vertical lettering, the use of instruments, the technics of presenting ideas in graphic fashion, and the conventions of machine drawing. These exercises are designed to develop the student's ability to follow oral, written, and pictured instructions, to teach him to develop surfaces, and to present his ideas through orthographic or isometric drawing and technical sketching. Section two is built around the study of various types of mechanisms and of their importance to machine design, with lessons on how to draw cams and gears, linkages and quick-return motions. Slant-type lettering is used in the second part, and a greater degree of accuracy as well as a finer drawing technic is required in the later lessons.

Harold J. Brodie is at the Rochester Athenaeum and Mechanics Institute.

PAMPHLETS:

Electric Instruments, Principles of Operation is a new General Electric publication presenting a concise discussion of the characteristics of instruments, what makes them operate, and the individual limitations of the various types. General Electric Company, Schenectady, New York.

Transportation Training is an informational bulletin published by the Office of Defense Transportation to assist the personnel managers of transportation companies in the training of new employes. The main purpose of the bulletin is to present helpful information and workable training programs that might otherwise escape notice. Sections on transportation training in railroads, local transit, trucking, automotive maintenance, and airlines. General problems are discussed, references and training helps given. Directory of Division of Transport Personnel listed. Write Personnel Training Section, Division of Transport Personnel, Office of Defense Transportation, Washington, D.C.

Receiving the International Morse Code is a teachers' handbook by Victor J. Smith designed especially for use in the Army-Navy accelerated flight program. The code is taught through the use of the symbols "dit" and "DAH" to signify the short and long sounds usually represented by dot and dash. Work in numerals and in Army-Navy special terms is included. Price 25c.

A Student Workbook, available for use with the manual, provides space for class exercises and assignments. 15c. Write for either to Victor J. Smith, Coordinator Navy Flight School, Sul Ross State Teachers College, Alpine, Texas.

Training Women for War Work provides a basic outline for determining the needs of an organization and adapting its facilities. Preparatory training, induction, on-the-job, and supplementary training, as well as apprentice training are discussed. Need for and place of the woman counselor and the desirable characteristics she should possess are set forth. Training assistance available through the Apprentice-Training Service is listed, as are the representatives of the nine regions of the United States. War Manpower Commission, Bureau of Training, Apprentice-Training Service, Washington, D.C.

VISUAL AIDS:

Glue Recommendations for U. S. Government Specifications is a new chart published by Casein Company of America. Fifty-seven uses, together with the requirements for each and the glues which comply with them, are listed. Write Casein Company of America, 350 Madison Ave., New York 17, N.Y.

How Prints Are Made, a traveling exhibit illustrating the various processes of the graphic arts, is available to schools free of charge. Processes described in the exhibit include line engraving, silk-stencil printing, etching, aquatone, collotype, rotogravure, etc. For full details write U.S. National Museum, Division of Graphic Arts, Washington, D.C.

A Thousand Hours is a single reel 16mm sound motion picture designed especially for use in preflight pilot training courses to show the importance of study in fitting the individual for aviation. Explanation of how the radio beam guides planes in flight illustrates the importance of thorough knowledge of mathematics and physics. $36.50. Jam Handy Organization, Detroit, Mich.

American Handicrafts is a 16mm film on the textile, pottery, glass-blowing, and wood-carving industries carried on in the cottages of the North Carolina mountains. Ten minutes in length. Black and white, $36; sound and color, $72. Rental, $1.50 and $3.00, respectively. Bell and Howell Company, Chicago, Ill.

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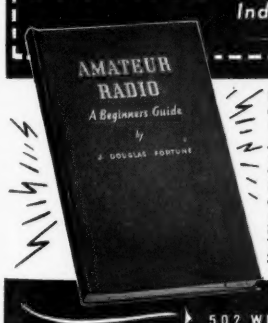

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news

WHAT'S DOING IN THE FIELD OF INDUSTRIAL EDUCATION

A REVISION has been made in the administration of the preinduction training program by the Army and increased emphasis is being placed on the participation of schools in the activity. Formerly under the direction of civilian personnel, the program has been restaffed with military personnel. Col. William E. Watters is the new chief, Preinduction Training Branch, Military Training Division, Army Service Forces. Merwin M. Peake, former civilian head of the branch, has been named chief of the Civilian Training Branch, Army Service Forces. The Preinduction Training Branch will continue to carry on the already established program which has been found to be a valuable preliminary to training by the armed forces. The Civilian Training Branch is responsible for the training of civilian employees of the Army Service Forces. Headquarters for both units are in the Pentagon Building, Washington, D.C. The Army area command set-up remains as before.

ON Pearl Harbor Day, 1943, L. S. Hawkins, director of Vocational Training for War Production Workers, announced that approximately six million men and women have been given training for war industry since July 1, 1940. This number represents more than one quarter of all workers employed in war-production industries at the peak of production. Approximately 1,500,000 workers have been given training in aircraft service occupations. There were nearly 1,000,000 enrolments in courses set up to train workers for the shipbuilding industry. The machine-tool industry has benefited through training in the public vocational schools to the extent of more than 1,000,000 enrolments in machine-shop courses. Almost 200,000 persons have been given training in radio occupations, more than 131,000 in automotive service occupations, and approximately 100,000 in electrical services. Approximately 1,000,000 women have been given training in courses designed to prepare them for scores of occupations essential to war industries. Currently, almost one third of the war-production trainees attending courses in public vocational schools are women. One of the major responsibilities of the U. S. Office of Education and state boards of vocational education is the development of efficient training of industrial supervisors. Approximately 500,000 such supervisors have been given training in foremen training conferences and job instructor training courses.

NATIONAL Printing Education Week is being celebrated for the sixteenth annual observance January 17-22. This activity is carried on under the auspices of the National Graphic Arts Education Association and will serve to commemorate Benjamin Franklin's 238th birthday anniversary. Teachers of printing are urged to participate through programs, exhibits, radio, newspaper articles, and other means. Background material may be obtained from the Association, 719 Fifteenth St. NW, Washington, D. C.

AT a dinner meeting of the Pennsylvania State School of Aeronautics Vocational Association at Harrisburg on November 11, Robert T. Stoner, principal of the State School of Aeronautics, was presented with a life membership in the American Vocational Association. Members of the supervisory and administrative staff of the school are shown below.

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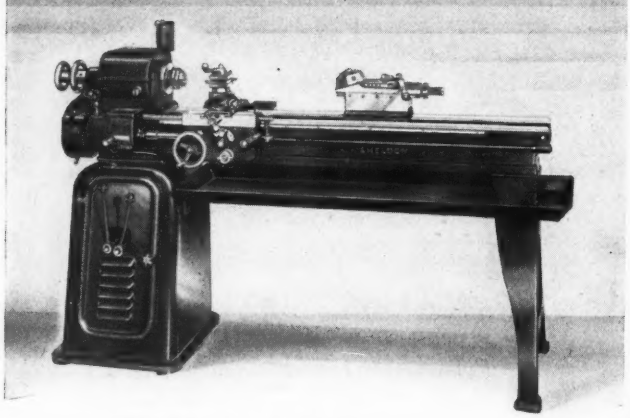

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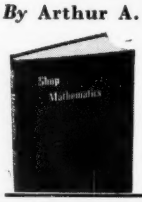

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From left to right, they are J. D. Zeiter, maintenance shop supervisor; R. P. Garver, supply training supervisor; R. A. Rosenberry, supervisor of related subjects; R. E. Wright, special supervisor; David James, supervisor, placement and records; Raymond Hoffman, equipment supervisor; J. P. Wachtman,

safety engineer and assistant shop supervisor; and R. T. Stoner, principal. In the past 20 months, the school has graduated over 13,000 individuals from specialized courses of an average length of 12 weeks. The maximum enrolment at any one time was 4,060 on two shifts with a staff of over 500 people. The school enjoys the reputation of being one of the largest of its kind in the country. Mr. Stoner is a pattern maker by trade, taught industrial arts for five years and vocational industrial woodworking and adult education for five years in the Lancaster, Penna., schools. He was director of vocational educational in Derry Township Schools, Hershey, Penna., and Senior Adviser for Industrial Education in the Department of Public Instruction, Harrisburg.

ALL education, including vocational, is cultural according to the editor of *Power*, Philip W. Swain, who recently spoke before the Midwest Power Conference at Chicago. "The only proper object of education is to train the student to live a happy and useful life," said Mr. Swain. "That is why truly vocational training must take first place as the prime essential for both usefulness and happiness. . . . I am positive my shop experience had more purely cultural value than my Greek, to say nothing of its relative vocational practicability."

IN THE Morning Mail . .

[Brief comments about SCHOOL SHOP and the field it serves are invited. Address the Editor, SCHOOL SHOP, Ann Arbor, Michigan.

Gentlemen:

Wish to advise that SCHOOL SHOP has been of great value to me in obtaining supplies and equipment.

I have a suggestion to make that you start a classified advertising department in your journal to carry such items as surplus equipment that schools have acquired and no longer need. For instance, we now have on hand two Buffalo forges with 12″ blowers and 18″ fire pots, one 5 H.P. 440-volt A.C. high-speed motor suitable for a 48″ wood planer, one 20″ upright floor drill press, a 1 H.P. 220-volt motor, and a 1 H.P. 220-volt 1200 R.P.M. motor. All are in fine shape.

H. F. DONOVAN
Director of Vocational Education
Canton, N. C.

[To Director Donovan, thanks for his suggestion in the shape of a free listing of the equipment he has for sale. We will check with him later to see if he sold the above items. If he did and others have similar pieces of equipment they want to sell or buy, we will be glad to carry a classified department as a service to our readers.—*Ed.*]

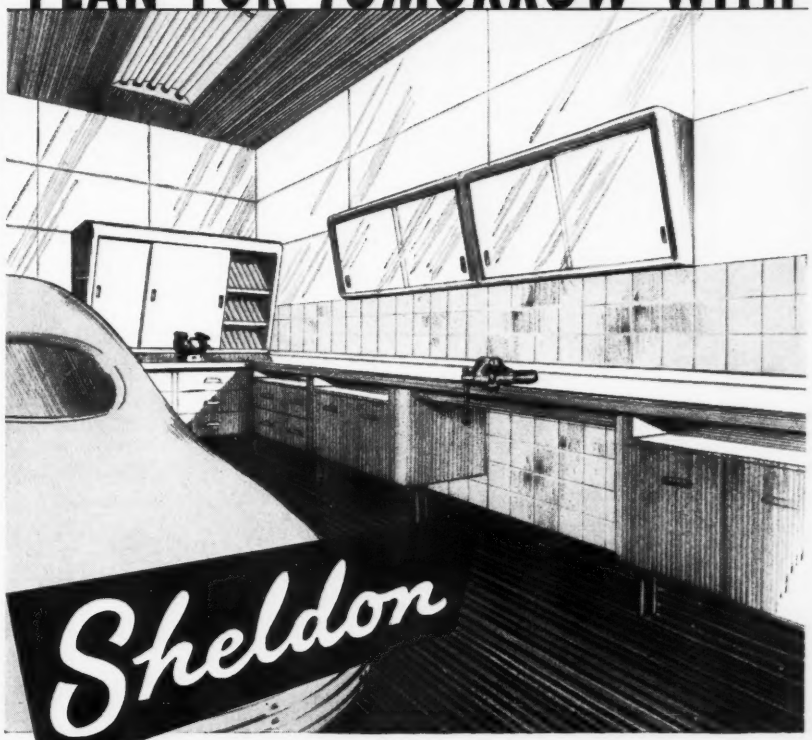
Gentlemen:

As a result of reading newly phrased words from war industries, the following combination occurred to me as a rather good formula for a success slogan that might be used in school shops:

"Know How" + "Know What" + "Know Why" = "Can Do."

CHARLES ZIRN
Manhattan School of Aviation Trades
New York, N. Y.

PLAN FOR TOMORROW WITH



VOCATIONAL AND LABORATORY FURNITURE

Here's an artist's conception of an automotive shop for tomorrow. Radical? Yes! But—who can safely predict what changes or innovations will take place. In all frankness we say—let's talk things over. You have the ideas and knowledge of changes which tomorrow's requirements will demand. We have the successful practical experience in planning and building vocational and laboratory furniture. Through working together—planning together NOW, we can prepare to meet tomorrow's requirements.

Write today and request that our Field Engineers call. You will find these engineers keenly alert to your needs—you will find them fully capable of helping you visualize and reduce to practice the ideas which you are now formulating. Plan now for tomorrow.

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Paper Trimmer

BY *Howard W. Boekeloo*

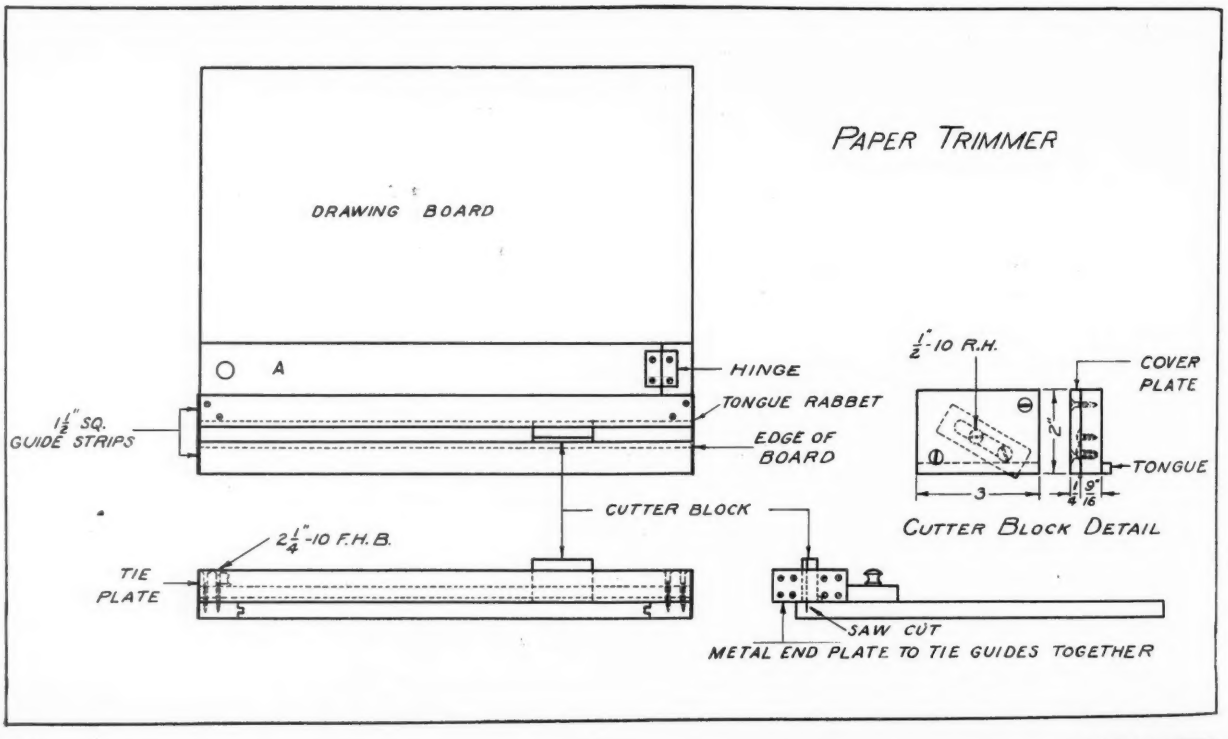
This paper trimmer is a good woodworking project which will be useful in the drawing room. It also is of value for amateur photographers for use in the trimming of prints. The trimmer made by the author has been in constant use over a long period of time in the mechanical drawing department of Central High School, Kalamazoo, Michigan, where he teaches drawing.

TESTED INSTRUCTIONAL PROJECT

WHILE built almost entirely of wood, this paper cutter may be improved perhaps by substituting metal for various parts. However, it has proved efficient for trimming all sizes of drawings up to 12″ x 18″. A Durham Duplex safety-razor blade furnishes the cutting edge and seemed to be more satisfactory than other types due to the long slot which permits adjustment. Place the blade so that the corner protrudes only about 3/32″. It will then be found that a moderately deep, fine saw cut in the board will allow the blade to be advanced as the edge grows dull.

If difficulty is experienced with students removing the cutter block, a tongue ¼″ square may be fastened along the bottom of the block which in turn travels through a rabbet cut lengthwise out of the lower inside corner of the guide. This will prevent the removal of cutter except when blade adjustment is necessary. The screws on one side of the end plate can be removed and the cutter block slipped out.

A thickness of blotting paper may be glued to the underside of the strip *A* which is designed to hold the paper. This gives greater friction and prevents the paper from slipping about if one hand is pressed on the strip while operating the cutter. Border lines should all be drawn to the edge of the paper to line up the cuts with the center of the saw slot.



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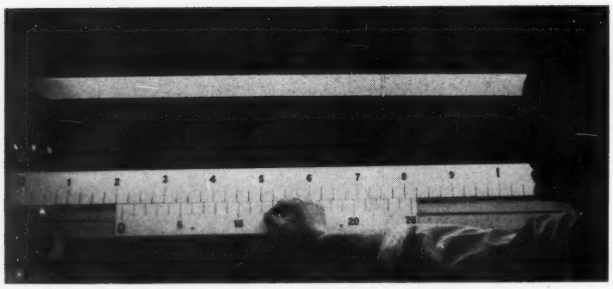


Teaching the Use of the Vernier Scale

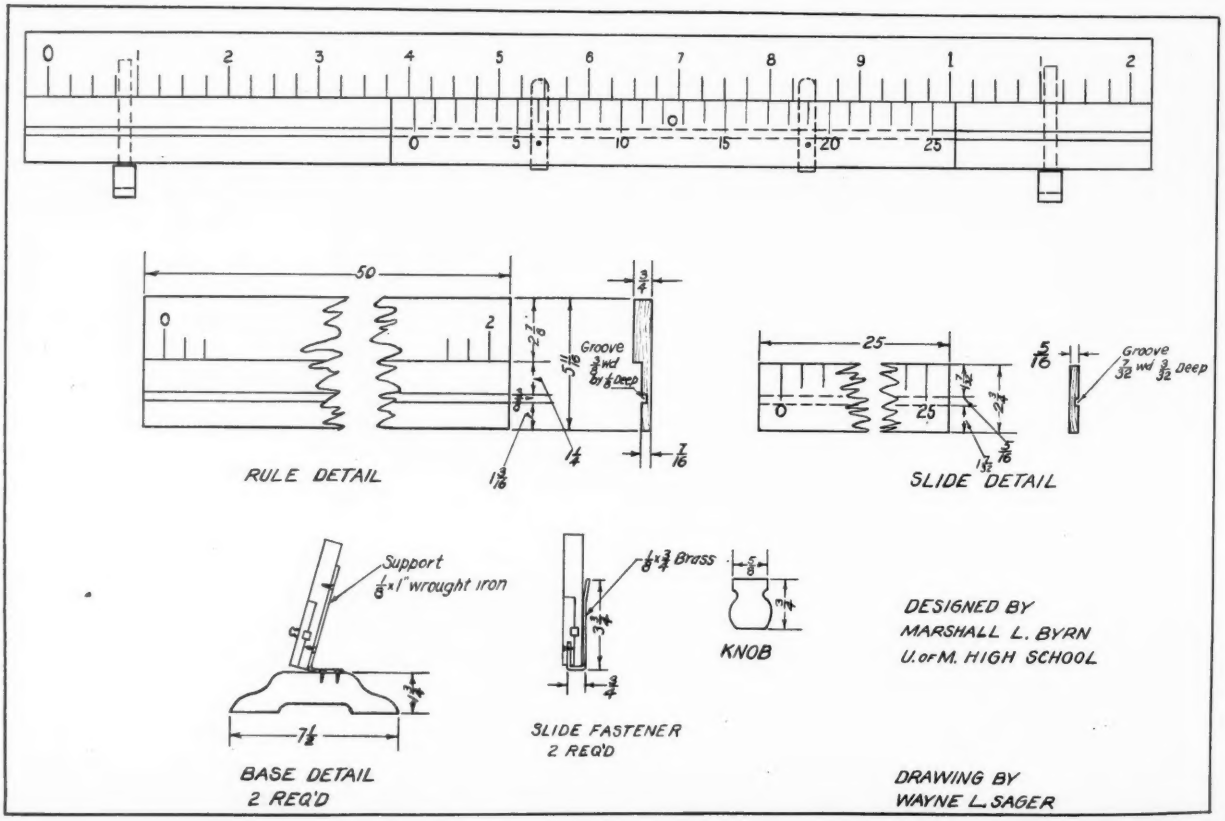
BY *Ward Sager*

The ability to use precision instruments is a necessity in modern industry. This device can be used to show clearly the use of the vernier scale. It was developed in the University of Michigan High School Industrial Arts Department under the direction of Marshall L. Byrn. The author is a member of the faculty of the Central Michigan College of Education, Mount Pleasant.

ENLARGED slide rules have been used as instructional aids in mathematics and physics classes for many years and the idea for the vernier scale shown in the cut was derived from that source. Now, more than ever before, students in advanced shop courses should acquire ability to use precision instruments commonly employed in industry and the enlarged vernier scale has been found helpful in demonstrating the principle of that measuring device. Reference to the drawing shows that no unusual problems are presented in its construction. Maple or birch are recommended. However, yellow poplar or basswood could be used. Whatever species is selected should be straight grain and thoroughly dry to avoid warping.

Finished measurements of the large scale or rule are $\frac{3}{4}$" x $5\frac{3}{4}$" x 50". A rabbet $2\frac{3}{4}$" wide and 5/16" deep is cut out on the lower side as shown in the detail drawing. This can be done on the circular saw or by use of a combination plane. After cutting material for the slide to the measurements given, 5/16" x $2\frac{3}{4}$" x 25", a groove is cut in both rule and slide. The groove should be 7/32" wide and 3/32" deep. A strip is then cut and glued into the groove of the slide. Two clips or fasteners are necessary for holding the sliding scale in place and they are formed from brass or wrought iron in the shape indicated. A mortise is cut in the lower edge of the sliding scale to fit the short bend of the clip and it is secured by a No. 6-32 F.H. machine screw. The fasteners or clips are designed so that they can be adjusted to permit free movement of the sliding scale. A small knob may be lathe turned and attached to the sliding scale with a F.H. wood screw.

A satisfactory method for mounting the vernier scale is shown in the base detail. Wrought iron or brass may be used for the supports which are bent to form an angle of 75°. The feet may be made from 5/4" or full 1-inch material. It will be noted that, when mounted, the scale is inclined at an angle of 15°. This slight inclination permits reading the measurements at a greater distance than would be possible were the scale perpendicular to the base. After finish sanding of all parts, one or more coats


RULE DETAIL
SLIDE DETAIL
Groove 3/32 wd by 3/32 Deep
Support 1/8 x 1" wrought iron
BASE DETAIL 2 REQ'D
SLIDE FASTENER 2 REQ'D
1/8 x 3/4 Brass
KNOB
DESIGNED BY MARSHALL L. BYRN U. of M. HIGH SCHOOL
DRAWING BY WAYNE L. SAGER

of white shellac or clear lacquer may be applied.

Either of two methods may be employed for marking the graduations and numerals on the rule and vernier. One method would involve laying off the graduations on white drawing paper with black India ink and gluing the paper to the scales with rubber cement or other suitable adhesive, while a second, and preferable, method involves the application of several coatings of semi-gloss enamel to the face surface of rule and vernier and then laying off the graduations on the enameled surfaces. The first method presents the difficulty encountered in gluing paper without resulting wrinkles but may be said to have an advantage in that the paper may be attached to a drawing board and drawing instruments used for ruling the graduations, whereas, marking graduations directly on the scale must be done with try square or ruler at some sacrifice of accuracy unless great care is exercised.

For enameled faces, it was found that at least three coats are needed and each coat should be rubbed smooth using 0000 sandpaper. For the final rubbed finish, a moistened cloth and Dutch Cleanser were found to produce a very smooth surface to which the graduation lines applied with India ink would adhere. It will be noted that graduations on the large rule are spaced 1" apart while those on the vernier scale are .96". Graduation lines are 1/32" wide and may be made quite easily with an ordinary ruling pen.

Methods of instruction in the use of the vernier scale may be found in standard textbooks.

A Problem In Deck Fittings

(Continued from page 15)

After the details have been completed and, of course, checked, an assembly drawing should be made from the student's own details, without referring to the original data from which the details were made.

Students have voluntarily stated that they enjoyed working on this problem, and, in the last analysis, student interest is the proof of the effectiveness of instruction.

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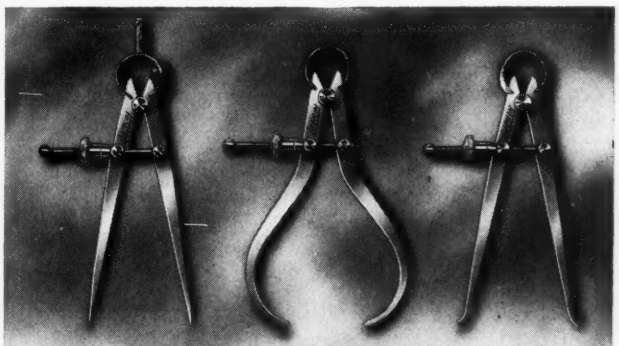

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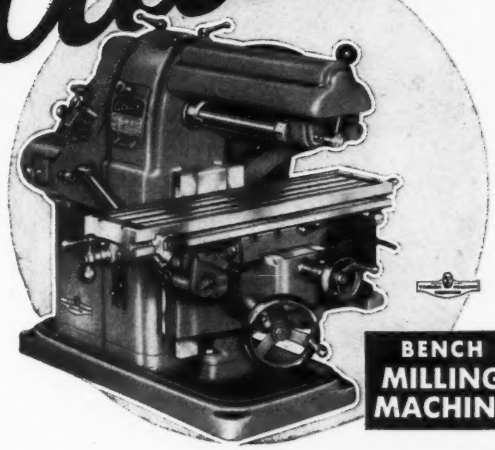

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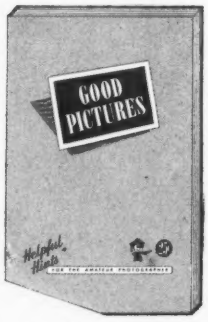
. . . news from INDUSTRY

ABC'S OF AUTOMOBILE DESIGN OFFERED BY STUDEBAKER

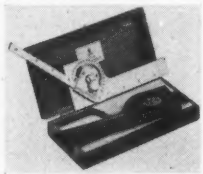
A primer that explains in the simplest possible terms the construction and functions of the principal elements of a passenger automobile is made available to teachers by the Studebaker Corporation. The handbook discusses the mechanism under six major units: running gear, power plant, power transmission system, body and control instruments, lighting, and accessories. Also dealt with are such related subjects as types of bearings, engine compression, horsepower, and commonly used small tools. Appendix contains cutaway drawings of typical assemblies such as side and end views of engine, clutch, transmission, etc., while the body of the book also is well illustrated. A 16-page quiz manual covering definitions and descriptions of functions is also furnished on request. Write the Studebaker Corporation, South Bend, Ind., or *check number 41 below.*

ARGUS OFFERS BOOKLET ON GOOD PICTURES



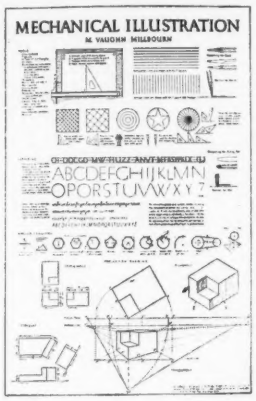
Helpful hints on projecting slides to obtain the best results are given in *Good Pictures,* a booklet presented by the makers of Argus cameras. Other subjects discussed are selection of film, enlarging, developing, exposure, filters, depth of field, etc. Available at 25c per copy. Write International Industries, 405 Fourth St., Ann Arbor, Mich., *or check number 42 below.*

INDUSTRIAL ENGINEERING CO. ANNOUNCES IMPROVED PROTRACTOR



Xactor, the improved protractor put out by the Industrial Engineering Co., Inc., permits measurement of any surface angle directly, without the aid of any attachments. An adjustable sliding arm which turns on a pivoted segment can be rotated to any position. Degree graduations are so arranged that the component angle as well as the required angle may be read directly. Equipped with vernier. Accurate, light in weight, no projecting setscrew or clamping attachments. Pocket size. Write Industrial Engineering Co., Inc., 141 West Jackson Blvd., Chicago, Ill., *or check number 43 below.*

LOUIS MELIND OFFERS WALL CHART



Basic principles of mechanical illustration are demonstrated on the 22½" x 35" wall chart the Louis Melind Company is offering free to teachers who write for it on school stationery. Drawn in Justrite Drawing Ink by M. Vaughn Millbourn, instructor at the Chicago Academy of Fine Arts. Address Louis Melind Company, 362 West Chicago Ave., Chi*cago 10, Ill., or check number 44 below.*

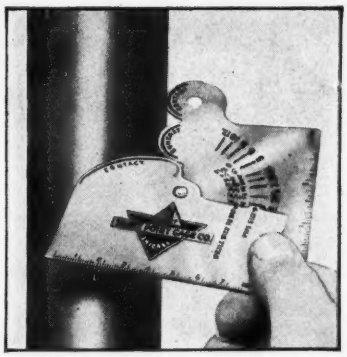
ENGINEERING MANUAL ON SPEEDMASTER PULLEY

Applications of the Speedmaster "Pulley of a Thousand Speeds" to saws, milling machines, grinders, and lathes are described in the new Engineering Manual just announced by the Speedmaster Company. What the Speedmaster is, how it operates, and how to care for it are discussed. Several types of pulleys are illustrated and various methods of mounting shown. Engineering installation service, price list, and specifications are given. Write the Speedmaster Co., 1248 Thacker Street, Des Plaines, Ill., *or check number 45 below.*

NEW POCKET SIZE PIPE GAGE

A new pocket size Three-Point Gage which will instantaneously measure any pipe size from ⅛" to 12", and which may be applied in dark places and taken to the light for reading, has been announced by the Three-Point Gage Company.

This steel gage, which may be used in any position, consists of two pivoted plates with edges curved at three points for contact with the pipe. The two fixed contact points are placed against the outer contour of the pipe, and the movable plate is slid along until it makes the third contact. The scale reads the size of the pipe in terms of inside diameter and the correct drill size for tapping. For information write Three-Point Gage Co., 3821 Broadway, Chicago, Ill., *or check number 46 below.*



THICKNESS PLANER PRODUCED BY BOICE-CRANE

A new 12" by 4" thickness planer which will plane the hardest and most "splintery" woods down to veneer-like thickness has been produced by the Boice-Crane Co. Stock as short as 6½" may be used, and finish applied without sanding.

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Lafayette Radio Corporation announces a new catalog No. 94, listing their complete line of radio and electronic equipment. Write Lafayette Radio Corp., 901 W. Jackson Blvd., Chicago 7, Ill., *or check number 48 below.*

Proper selection and use of blades on different kinds of metal and at different speeds are discussed in the new Star Catalog No. 43-S, just announced by Clemson Brothers. Catalog is in loose-leaf form for easy addition of material. Write Clemson Bros., Inc., Middletown, N.Y., *or check number 49 below.*

Each item listed above is numbered. Check the numbers of the items you want, and mail the coupon, properly filled in, to . . .

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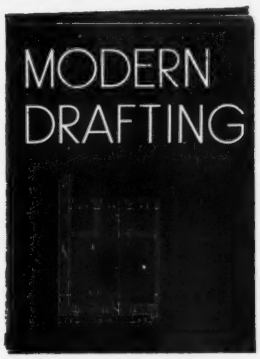

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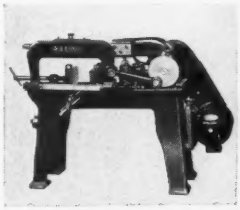

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A Sprinkling Can

BY *N. H. Poole*

TESTED INSTRUCTIONAL PROJECT

THIS project has been found to be very helpful in the teaching of beginning sheetmetal work. It is simple and requires little stock, yet the student must work accurately and follow certain accepted practices or the project will show errors and poor workmanship in various phases of its construction.

While the can is intended for use as a small house-plant sprinkler, it may be used to dispense soap granules by drilling the holes larger. As the capacity of the sprinkler is one quart, it can be used in the home garage in adding antifreeze to the radiator or for an oil measurer and container.

This project teaches layout, cutting, soldering flat seams, bending, sweat soldering, and the enameling of metal. It can be used to introduce some of the uses of the squaring shears, the bar folder, and the pan break. However, if sheetmetal working machines are not available, the project can be made by using the hand snips, a mallet, clamps, blocks of wood, soldering coppers, and hand seamers.

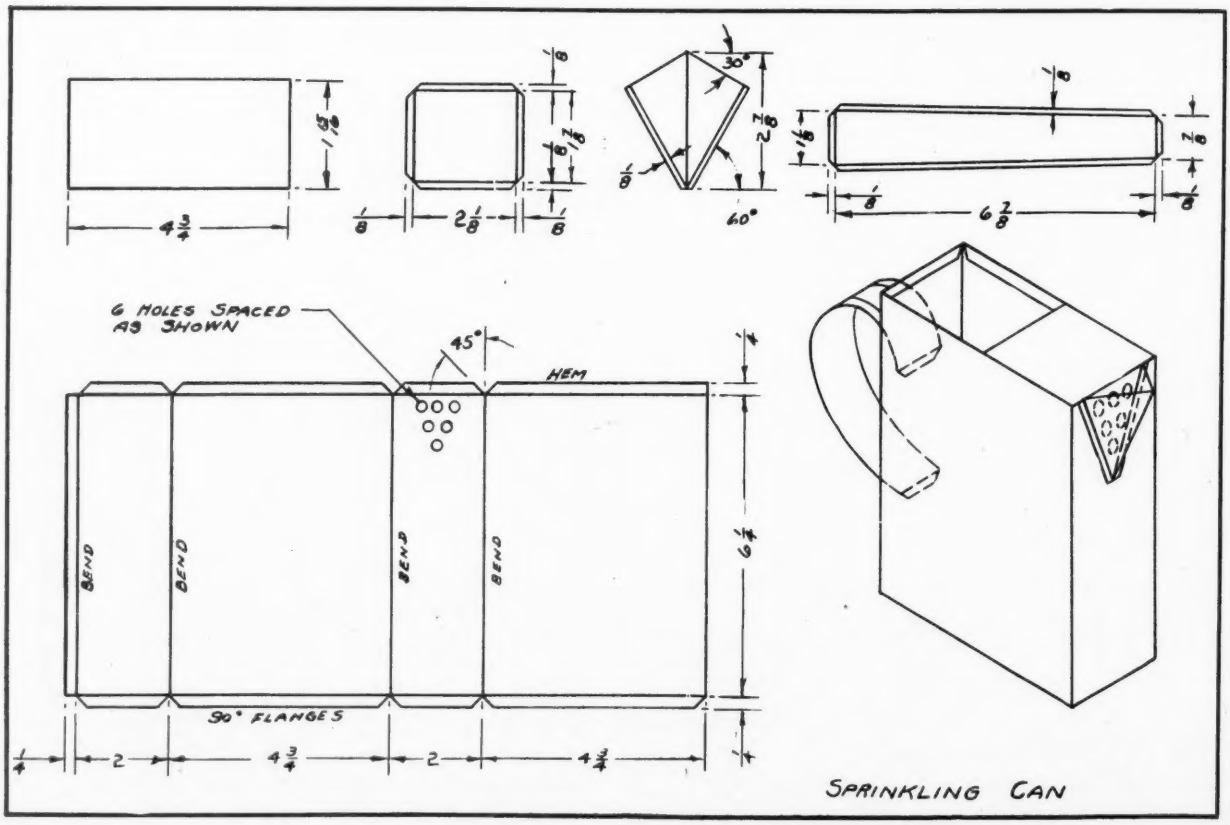
It is a good plan to give the class blueprints of the stretch-out which are drawn to half scale. They are then required to make a full-size layout on heavy paper. Next the paper is cut and the step-by-step procedure is marked on the paper as the model is shaped. Then a full-size stretch out is drawn on the metal and a scriber is substituted for the pencil in locating points and making lines.

The following procedure is used in the author's classes when this can is made:

1. Layout full-size pattern on paper for a model.
2. Draw stretch-out on the metal.
3. Cut to shape.
4. Form a single hem on the top of the can.
5. Form a 90° flange on the bottom of the can.
6. Form a 90° flange on one end of the can.
7. Form the can into shape, making all corners square.
8. Solder the end flange to the side.
9. Lay off and drill the holes.
10. Layout, cut form, and solder the spout to the can. Keep the back of the spout even with the top edge of the can so that the water will not spill over the sides.
11. Solder the bottom in place. Inspect joints for leaks.

(Continued on page 30)

This simple and utilitarian sheetmetal project is excellent for beginning classes and can be made without the use of sheetmetal working machines, if need be. The author teaches general metalworking at the Emmerich Manual Training High School, Indianapolis, Indiana.



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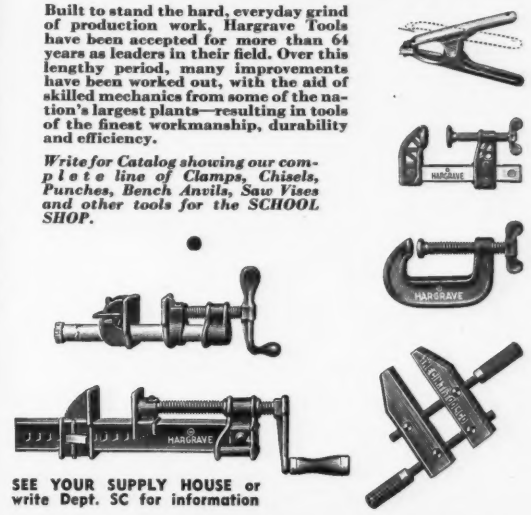

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Please emphasize the instructional values of project material. Send in clear glossy photographs and good working drawings in ink on white paper. Articles are paid for at regular space rates. Send them to

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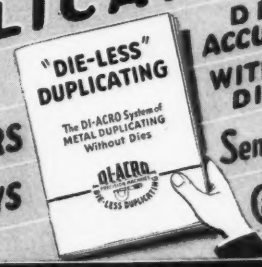

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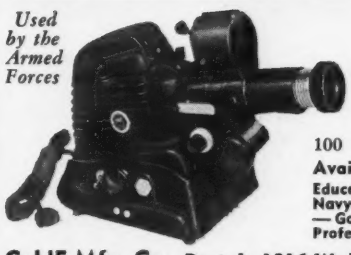

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Making a Center Punch

BY *William H. Johnson* AND *Louis V. Newkirk*

Superintendent of Schools, Chicago, Illinois — **Director of Industrial Arts Education**

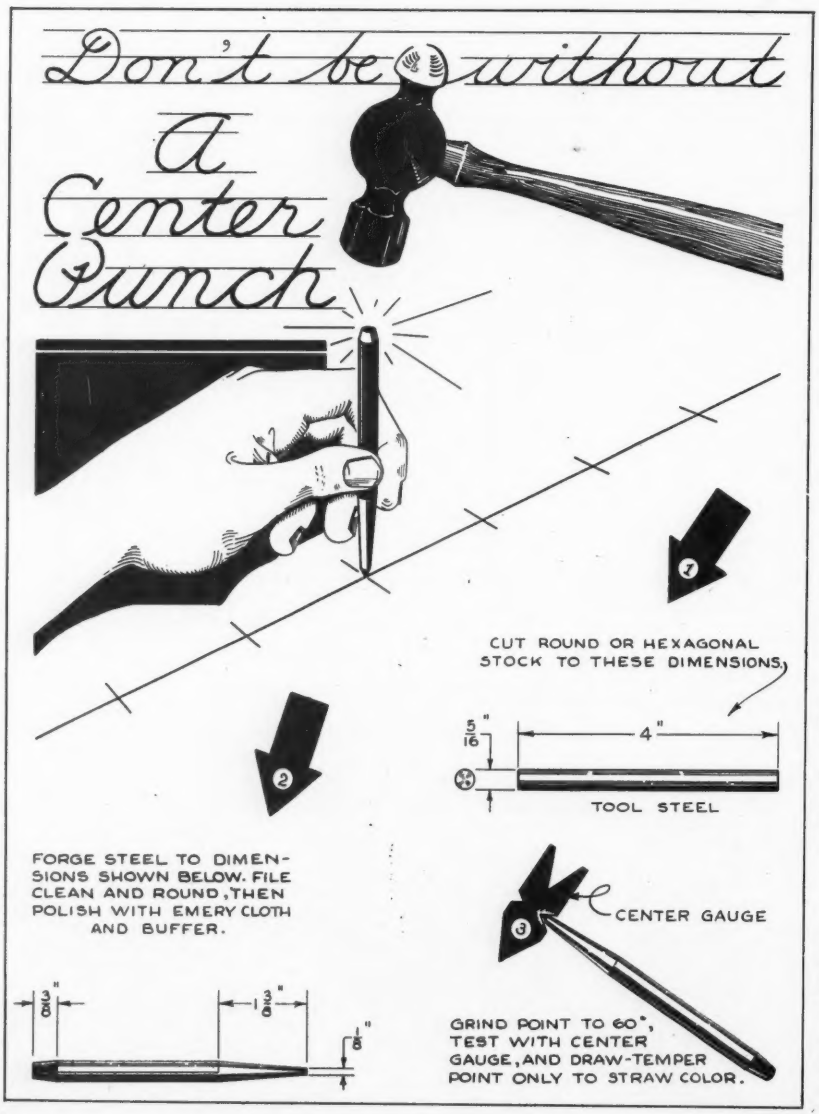
TESTED INSTRUCTIONAL PROJECT

THE center punch is used to mark the location of holes that are to be drilled. As metal work requires the drilling of many holes, it is easy to understand how often a center punch is used. To make your own punch, select a piece of unhardened tool steel 5/16″ in diameter and cut a 4″ length.

Heat the rod to a red heat in a furnace and draw it out to a point as shown below. Strike heavy blows at first, drawing the point out to a square. Then strike at the corners to form an octagon. End with rather light blows to make the point as round as possible. Reheat as many times as necessary. Allow the rod to cool slowly.

Smooth the tapering point with a mill file. Remove all nicks and marks. Forge and file a slight taper on the other end. Polish the punch with a piece of fine emery cloth. Grind a 60° point on the punch using the power grinder. File and grind a chamfer on the other end.

To harden, heat the punch to a red heat and plunge only the point into water immediately withdrawing it. Rub off the scale with emery cloth and as the point becomes straw-colored drop the punch into the water. Give the tool a final polish with fine emery cloth.


Don't be without a Center Punch
1
CUT ROUND OR HEXAGONAL STOCK TO THESE DIMENSIONS.
5/16"
4"
TOOL STEEL
2
FORGE STEEL TO DIMENSIONS SHOWN BELOW. FILE CLEAN AND ROUND, THEN POLISH WITH EMERY CLOTH AND BUFFER.
3/16"
1 3/8"
1/8"
3
CENTER GAUGE
GRIND POINT TO 60°, TEST WITH CENTER GAUGE, AND DRAW-TEMPER POINT ONLY TO STRAW COLOR.

Sprinkling Can *(From page 28)*

12. Shape the handle and place an excess amount of solder on each end so that it can be sweat soldered to the can.

13. Layout, cut, shape, and solder the baffle plate into place.

14. Clean the can first with fine steel wool and then wash with benzine or alcohol.

15. Give sprinkler one or two coats of enamel. Enamel the inside first. Suitable colors are red, green, ivory, or yellow.

16. Paint design on side or use a warm water decal.

From Washington *(From page 32)*

completed. Safest first step is to survey the community's industries and find out which, if any, need technicians' help. Every possible fact about the nature of the technician's job should be gathered. Then the school administrator may wish to set up one or two courses on a post-high-school level in those occupations most urgently needed by local industry. Such initial steps will blend in with the larger programs being mapped by the Vocational Technical Committee working in Washington and in the states.

● Surplus or obsolete Army airplanes, engines, airframe parts, and instruments are now moving into schools teaching aeronautics.

Requests from 737 schools, in every state but Florida and Arkansas, have already been approved by the CAA's aviation education service staff.

As a result of applications made through CAA, the Army has already shipped to schools 226 engines and 59 airplanes, at no charge except the cost of shipping.

Application forms for equipment are distributed by CAA through state education authorities, the completed blanks reviewed by CAA, and are then turned over to the Army. The CAA review makes sure that the requests are reasonable. One school with 30 aeronautical students, for example, asked for 10 planes.

CAA also has arranged a procedure whereby the schools are informed on weight and shipping point, so they can estimate freight charges. In this way it helps avoid episodes such as occurred before the distribution was put on an organized basis. A school ordered a bomber, and it came, in three cars, along with a freight bill for $900.

"Why shouldn't I buy it? I've got the money!"

Sure you've got the money. So have lots of us. And yesterday it was all ours, to spend as we darn well pleased. But not today. Today it isn't ours alone.

"What do you mean, it isn't mine?"

It isn't yours to spend as you like. None of us can spend as we like today. Not if we want prices to stay down. There just aren't as many things to buy as there are dollars to spend. If we all start scrambling to buy everything in sight, prices can kite to hell-'n'-gone.

"You think I can really keep prices down?"

If you don't, who will? Uncle Sam can't do it alone. Every time you refuse to buy something you don't need, every time you refuse to pay more than the ceiling price, every time you shun a black market, you're helping to keep prices down.

"But I thought the government put a ceiling on prices."

You're right, a price ceiling for your protection. And it's up to you to pay no more than the ceiling price. If you do, you're party to a black market deal. And black markets not only boost prices—they cause shortages.

"Doesn't rationing take care of shortages?"

Your ration coupons will—if you use them wisely. Don't spend them unless you have to. Your ration book merely sets a limit on your purchases. Every coupon you don't use today means that much more for you—and everybody else—to share tomorrow.

"Then what do you want me to do with my money?"

Save it! Put it in the bank! Put it in life insurance! Pay off old debts and don't make new ones. Buy and hold War Bonds. Then your money can't force prices up. But it can speed the winning of the war. It can build a prosperous nation for you, your children, and our soldiers, who deserve a stable America to come home to. Keep your dollars out of circulation and they'll keep prices down. The government is helping—with taxes.

"Now wait! How do taxes help keep prices down?"

We've got to pay for this war sooner or later. It's easier and cheaper to pay as we go. And it's better to pay more taxes NOW—while we've got the extra money to do it. Every dollar put into taxes means a dollar less to boost prices. So . . .

Use it up . . . Wear it out . . . Make it do . . . Or do without

A United States war message prepared by the War Advertising Council, approved by the Office of War Information, and contributed by the Magazine Publishers of America

from WASHINGTON by MICHAEL PACA

BRIGHT spot in an otherwise gloomy month of educational news is the work of the Vocational Technical Committee, detailed in the larger portion of this dispatch.

Most of the month, however, Washington officials were busy piecing together what emerged as a not-too-happy picture of education ravaged by war. Some of the darker dabs on that canvas follow:

Our high schools have lost 1,000,000 pupils since the beginning of the war, taking us back to the enrolment figures of 10 years ago.

Our elementary-school enrolment is back where it was 30 years ago.

Special school services are being crippled. Vocational agriculture, to cite one example, lost more than half its 9000 teachers, forcing the closing of 1500 "ag" departments.

Youth who should be in school are at work or idling in the street, neglected by working parents. The National Child Labor Committee estimated that 3,000,000 children are employed at present.

Senator Pepper's special committee investigating juvenile delinquency heard heart-wringing stories of children turning barbarians while their fathers or brothers are fighting the barbarians overseas.

"The most potentially destructive development," says the National Education Association, "is the 60 percent drop in teacher-training enrolments." For example, no more than 100 new vocational "ag" teachers will be graduated in 1944 from institutions normally graduating 1800.

"Doubly needed and doubly blessed, therefore, is the loyal schoolman who stays on his job in these critical days," says one Washington official.

● Now for that brighter spot in this month's news:

Quietly at work is a new committee just appointed by U. S. Commissioner of Education Studebaker. Its title is Consulting Committee on Vocational Technical Training. Its work is not far enough advanced for a report at this time.

It is riding on a "wave of the future" in vocational education. Its work may help to bring to pass quicker those "miracles ahead" in plastics, electronics, synthetics, alloys, and aviation. For, in brief, the work of this Committee is to promote the training of subprofessional technicians who will be required by these newer industries. Long established industries, too—steel, oil, textiles, chemicals—which are developing new products and better ways of making them, also need an increasing number of technicians, as do agriculture and business. Because of the great advances in America's ways of making and growing things, seven technical assistants are needed today to one college trained engineer. A decade ago that ratio was only three to one.

All state boards of vocational education are working with this Committee. And together they are, at present, doing two things. First: trying to find out what types of technicians industry needs and the numbers in which it needs or will need them. But more than that, the Committee is trying to get from industry an accurate description of what each technician is required to do, what tools he uses and what subject matter he is required to apply in his job.

The Committee should, therefore, come out with a sheaf of payroll job descriptions of technicians' day-to-day activities. These will later be analyzed for subject matter to be included in training programs.

Second: the Committee is checking on the facilities now available to train technicians. At present there are at least five types of such facilities: engineering college extension departments; junior colleges; vocational schools (such as the Brooklyn Technical High School); technical institutes; and private industries. The Committee is especially interested in still another type of training facility for technicians. An example of this is provided by one County Vocational School. This school operates one course on a posthigh-school level. In this instance, the course is in training technicians for industrial chemistry. Such technicians are greatly needed in the school's area because it contains large oil refineries.

These several types of institutions, still few in number, are trying bravely to fill in the gap which exists between the engineering university and the trade school. As American technology advances this gap widens. Hence, the Committee has a third task, namely, to recommend means for further developing vocational technical training programs and facilities.

● For whom is technical training designed? Basically, for two groups of people. The first includes workers already on the job who have some practical experience in trades. They have found their bearings. They desire to go ahead—but not as high as the scientific professions. The second group includes high-school graduates who want to prepare themselves directly for subprofessional positions.

Incidentally, this type of training should appeal very greatly to returning soldiers and sailors. Many of them will demand advanced technical courses since they will have had some good, basic mechanical training and experience in many trades in the service. They will want to build on their Army and Navy schooling. While they may not want to spend four or five years in a college, they may wish shorter, more practical training for technicians' jobs.

● The individual community, desiring to be in tune with this new trend, may well take an initial step even before the recommendations of the Committee are

(Continued on page 30)

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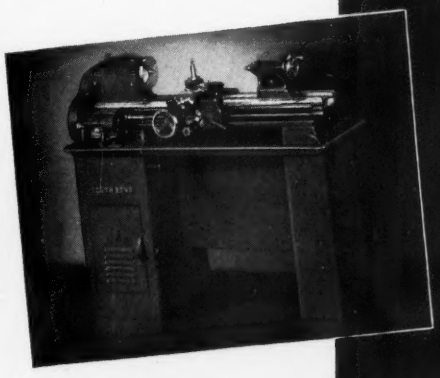
New Workers are Quickly Trained
ON SOUTH BEND LATHES



9″ swing, South Bend Engine Lathe

It is now recognized that the United States, as the principal arsenal of the Allied Nations, must continue to turn out munitions in ever increasing quantities. If the established production goals are to be attained, thousands of non-essential workers must be trained quickly for war production jobs.

Pre-employment training for new workers can be completed in a minimum of time when South Bend Lathes are used. Carefully designed for simplicity and ease of operation, these lathes have no unnecessary gadgets or intricate controls to confuse the beginner. Their smooth, quiet operation allays the nervousness often caused by the noise of ordinary machinery.

Because South Bend Lathes are so widely employed for war production work, their use for training purposes also saves on-the-job training time. The amount of individual coaching and supervision required to get new workers started is appreciably reduced when they are familiar with their machines.

There is a South Bend Lathe for most training requirements. Write for a copy of Catalog 100C in which they are all described.

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